PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY

HELD AT PHILADELPHIA FOR PROMOTING USEFUL KNOWLEDGE.

VOL. XXXIII. JULY TO DECEMBER. 1894. No. 146.

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☞ It is requested that the receipt of this number be acknowledged.

☞ In order to secure prompt attention it is requested that all correspondence be addressed simply "To the Secretaries of the American Philosophical Society, 104 S. Fifth St., Philadelphia."

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EXTRACT FROM THE LAWS.

CHAPTER XII.

OF THE MAGELLANIC FUND.

SECTION 1. John Hyacinth de Magellan, in London, having in the year 1786 offered to the Society, as a donation, the sum of two hundred guineas, to be by them vested in a secure and permanent fund, to the end that the interest arising therefrom should be annually disposed of in premiums, to be adjudged by them to the author of the best discovery, or most useful invention, relating to Navigation, Astronomy, or Natural Philosophy (mere natural history only excepted); and the Society having accepted of the above donation, they hereby publish the conditions, prescribed by the donor and agreed to by the Society, upon which the said annual premiums will be awarded.

CONDITIONS OF THE MAGELLANIC PREMIUM.

1. The candidate shall send his discovery, invention or improvement, addressed to the President, or one of the Vice-Presidents of the Society, free of postage or other charges; and shall distinguish his performance by some motto, device, or other signature, at his pleasure. Together with his discovery, invention, or improvement, he shall also send a sealed letter containing the same motto, device, or signature, and subscribed with the real name and place of residence of the author.

2. Persons of any nation, sect or denomination whatever, shall be admitted as candidates for this premium.

3. No discovery, invention or improvement shall be entitled to this premium, which hath been already published, or for which the author hath been publicly rewarded elsewhere.

4. The candidate shall communicate his discovery, invention or improvement, either in the English, French, German, or Latin language.

5. All such communications shall be publicly read or exhibited to the Society at some stated meeting, not less than one month previous to the day of adjudication, and shall at all times be open to the inspection of such members as shall desire it. But no member shall carry home with

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VOL. XXXIII. JULY TO DECEMBER, 1894. No. 146.

Stated Meeting, September 7, 1894.

President, Mr. FRALEY, in the Chair.

The death of Lord Coleridge, Chief Justice of England, was announced.

Mr. Lyman read the following correction of a statement made by Dr. Frazer in the last number of the Proceedings:

"In the last issue of the Proceedings, Vol. xxxiii, p. 216, for our last meeting, May 18, 1894, Dr. Persifor Frazer makes public a wholly mistaken impression in regard to my position and influence in the State Geological Survey. So far from being its 'quasi director,' I have never even had the honor of being strictly speaking a regularly employed, salaried Assistant Geologist of the Survey, but have only done contract-work for it; and have never had anything whatever to do directly or indirectly, by authority or by advice, in responsibility or in consultation, with the management or control of any part of the work of the Survey, except my own.

"In writing out his remarks, he must have believed he had uttered them essentially as they are printed; but anything in the least like so inexact a statement in that matter would have been corrected at once.

"BENJ. SMITH LYMAN."

Mr. Prime spoke of the gold regions of South Africa.

Pending nominations 1273, 1274, 1276 to 1301 (inclusive) were read.

And the Society was adjourned by the President.

PROC. AMER. PHILOS. SOC. XXXIII. 146. 2 H. PRINTED NOV. 19, 1894.

Stated Meeting, September 21, 1894.

President, Mr. FRALEY, in the Chair.

Correspondence was submitted as follows:

Letters acknowledging the receipt of diploma from Dr. Isaac Roberts, Crowborough, Sussex, England, and Hon. Robert E. Pattison, Harrisburg, Pennsylvania.

A circular from the Royal Society of New South Wales, Sydney, in reference to prizes for 1894, 1895 and 1896.

A circular from the Palæographical Society of Australasia, Sydney, setting forth the objects of the Society.

Communication from the Council of the Imperial Russian Geographical Society, in reference to the necessity of an International Agreement with regard to the publication of material contained in Naval Meteorological Journals.

Circular from the Secrétariat Général de la Société de Géographie de Toulouse, in reference to a decimal division of the day.

Prospectus of the nature and objects of the Royal Institution of Great Britain, London, England.

A letter from N. Borovko, Odessa, Russia, in reference to the question of an international language.

Letters of envoy were received from the Royal Society of New South Wales, Sydney; Mr. Edward Cousel, Melbourne, Australia; Geological Survey of India, Calcutta; Government Astronomer, Madras, India; Société Imp. Mineralogique, Comité Geologique, Observatoire Physique Central, St. Petersburg, Russia; Academia Romania, Bukarest; Universite R. de Norvège, Christiania; Fondation de P. Teyler van der Hulst, Hárlem, N. Holland; Maatschappif der Nederlandsche Letterkunde, Leiden, Z. Holland; K. Leopoldinisch-Carolinische Deutsche Akademie der Naturforscher, Halle a. S., Prussia; Gesellschaft zur Beförderung der gesammten Naturwissenschaften, Marburg, Prussia; Würtembergische Verein für Handelsgeographie, Stuttgart; Musée Guimet, Bureau of Longitudes, Société Philologique, Paris, France; Zoölogical

Society, Royal Society, London, Eng.; Royal Dublin Society, Royal Irish Academy, Dublin, Ireland; Geological Society of America, Rochester, N. Y.; U. S. Naval Institute, Annapolis, Md.; Musée de La Plata, La Plata, Argentine Republic, S. A.; Société Scientifica du Chili, Santiago; Instituto Fisico Geografico Nacional, San José, Central America.

Letters of acknowledgment were received from the Tokyo Library, Tokyo, Japan (139, 140, 141); Linnean Society of N. S. Wales, Sydney (141); R. Geographical Society (Queensland Branch), Brisbane, Queensland (141); Mr. Samuel Davenport, Adelaide, S. Australia (141); Royal Society of Victoria, Melbourne (141); Public Library, Wellington, N. Z. (137, 138, 141); Societas pro Fauna et Flora Fennica, Helsingfors, Finland (142); Physico-Mathematical Society, Kasan, Russia (140, 141, 142); Tashkent Observatory, Tashkent, Russia (142); Prof. Dr. Japetus Steenstrup, Copenhagen, Denmark (142); Biblioteca N. C., Firenze, Italia (142); R. Istituto Lombardo di Scienze e Lettere, Milan, Italy (142); R. Accademia d. Scienze Lettere ed Arti, Modena, Italy (142); Società Africana d'Italia, Naples, Italy (142); Prof. Giuseppe Sergi, Roma, Italia (142); R. Osservatorio dell' Università, Turin, Italy (142); Marquis Antonio de Gregorio, Palermo, Sicily (141); Société R. de Geographie, Anvers, Belgique (133, 142); R. Accademia degli Agiati, Rovereto, Tyrol (139, 140, 141); Gesellschaft für Erdkunde, Berlin, Prussia (142); Naturhistorische Verein, Bonn (141); Naturwissenschaftliche Verein, Bremen, Germany (141); Naturforschende Gesellschaft, Emden, Prussia (141); Naturhistorische Gesellschaft, Hanover, Prussia (139, 141); K. Sternwarte, Leipzig, Saxony (141); Verein der Freunde der Naturgeschichte, Mecklenburg, Germany (141); K. Sternwarte, Munich, Bavaria (142); Naturwissenschaftliche Verein, Osnabrück, Prussia (141, 142); Bibliothèque Cantonale, Lausanne, Switzerland (142); Academia des Sciences et Belles Lettres, Angers, France (141); Société Linneenne, Bordeaux (142); Société d'Histoire et d'Archæologie, Chalon-sur-Saone, France (142); Société des Sciences Naturelles et Archéologiques de la Creuse, Guéret,

France (142); Bibliothèque Universitaire, Lyon, France (142); Faculté des Sciences, Marseille, France (114, 115, 116, and Catalogue, Parts i–iv); Société Francaise de Physique, Société de l'Histoire de France (144), Rédaction de "Cosmos" (142, 144), Ministre des Travaux Publics (138, 141), Compte de Charencey, M. Victor Duruy (144), Profs. E. Levasseur (142), E. Mascart (142, 144), Gaston Maspero (142, 144), Léon de Rosny (142), Marquis de Nadaillac (142), Paris, France.

Letters of acknowledgment (145) were received from Mr. Horatio Hale, Clinton, Ontario; Bowdoin College Library, Brunswick, Me.; Society of Natural History, Portland, Me.; Amherst College Library, Amherst, Mass.; Massachusetts Historical Society, Athenæum, Boston Society of Natural History, State Library of Massachusetts, Boston Public Library, Mr. Robert C. Winthrop, Boston, Mass.; Museum of Comparative Zoölogy, Profs. Alexander Agassiz, George L. Goodale, Mr. Robert N. Toppan, Dr. Justin Winsor, Cambridge, Mass.; Essex Institute, Salem, Mass.; Marine Biological Laboratory, Woods Hole, Mass.; American Antiquarian Society, Worcester, Mass.; Rhode Island Historical Society, Providence; Mr. George F. Dunning, Farmington, Conn.; Connecticut Historical Society, Hartford; Prof. O. C. Marsh, New Haven, Conn.; New York Historical Society, Meteorological Observatory, American Museum of Natural History, New York Hospital, Columbia College, Academy of Sciences, Hon. Charles P. Daly, Capt. R. Somers Hayes, Profs. Joel A. Allen, John J. Stevenson, New York, N. Y.; Prof. James Hale, Albany, N. Y.; Buffalo Library, Buffalo, N. Y.; Prof. Edward North, Clinton, N. Y.; Profs. J. M. Hart, Burt G. Wilder, Ithaca, N. Y.; Prof. W. Le Conte Stevens, Troy, N. Y.; Academy of Science, Rochester, N. Y.; Vassar Brothers' Institute, Poughkeepsie, N. Y.; Dr. W. T. Barnard, Boonton, N. J.; Free Public Library, Jersey City, N. J.; New Jersey Historical Society, Newark; Prof. W. Henry Green, Princeton, N. J.; Prof. Martin H. Boyé, Coopersburg, Pa.; Hon. Eckley B. Coxe, Drifton, Pa.; Rev. Thomas C. Porter, Prof. J. W. Moore, Dr. Traill Green, Easton, Pa.; Mr. John

Fulton, Johnstown, Pa.; Linnean Society, Lancaster, Pa.; Dr. D. G. Brinton, Media, Pa.; Academy of Natural Sciences, Engineers' Club, Historical Society of Pennsylvania, Mercantile Library, Wagner Free Institute, Numismatic and Antiquarian Society, Editor of *The Medical News*, Public Library, Library Company of Philadelphia, Hon. James T. Mitchell, Gen. I. J. Wistar, Revs. W. H. Furness, H. Clay Trumbull, Profs. John Ashhurst, Jr., Edward D. Cope, F. A. Genth, Jr., Lewis M. Haupt, H. W. Spangler, Drs. George Friebis, Morris Longstreth, Charles A. Oliver, C. N. Peirce, W. S. W. Ruschenberger, Charles Schäffer, William Thomson, Messrs. Richard L. Ashhurst, R. Meade Bache, Cadwalader Biddle, Lorin Blodget, Patterson DuBois, Jacob B. Eckfeldt, William A. Ingham, E. V. d'Invilliers, A. S. Letchworth, Robert Patterson, Henry Phillips, Jr., Franklin Platt, Theodore D. Rand, L. A. Scott, N. P. Tatham, Louis Vossion, Mrs. Helen Abbott Michael, Philadelphia; Prof. John F. Carll, Pleasantville, Pa.; Mr. Heber S. Thompson, Pottsville, Pa.; Dr. W. H. Appleton, Swarthmore, Pa.; Rev. F. A. Muhlenberg, Reading, Pa.; Philosophical Society, Hon. William Butler, Mr. Philip P. Sharples, West Chester, Pa.; Wyoming Historical and Geological Society, Wilkesbarre, Pa.

Accessions to the Library were reported from the Royal Society of New South Wales, Mr. N. A. Cobb, Sydney, Australia; Royal Geographical Society of Australasia, Melbourne; New Zealand Institute, Wellington; Geographical Society, Tokyo Library, Tokyo, Japan; Government Observatory, Madras, India; Société Phys.-Mathématique, Kasan, Russia; Société des Naturalistes de la Nouvelle Russie, Odessa; K. K. Mineralogische Gesellschaft, Comité Geologique, Physikalische Central Observatoriums, St. Petersburg, Russia; Bataviaasche Genootschap van Kunsten en Wetenschappen, Batavia, Java; K. Bibliotheek, K. Zoologisch-Botanische Genootschap, 'S Gravenhage, Holland; Société Hollandaise des Sciences, Musée Teyler, Haarlem, Holland; Friessch Genootschap voor Geschied. Oudheid en Taalkunde, Leeuwarden, Friesland; Maatschappij der Nederlandsche Letterkunde, Holland;

Société Batave de Philosophie Experimentale, Rotterdam, Holland; Naturforschende Verein, Brünn, Austria; Siebenbürgische Verein für Naturwissenschaften, Hermanstadt, Transylvania; Gesellschaft der Wissenschaften, K. K. Sternwarte, Prag, Bohemia; Physikalische Gesellschaft, Deutsche Geologische Gesellschaft, K. P. Geologische Landesanstalt und Bergakademie, K. P. Meteorologische Institut, Berlin, Prussia; Naturhistorische Verein, Bonn, Prussia; Physikalisch-Medicinische Societât, Erlangen, Bavaria; Naturwissenschaftliche Gesellschaft "Isis," Dresden, Saxony; Gesellschaft zur Beförderung der gesammten Naturwissenschaften, Marburg, Prussia; Verein der Freunde der Naturgeschichte, Mecklenburg, Germany; Württembergische Verein für Handelsgeographie, Stuttgart; Société de Physique, Geneva, Switzerland; Società Toscana di Scienze Naturali, "Il Nuovo Cimento," Pisa, Italy; Comitato Geologico d'Italia, Rome; Société Linnéene, Bordeaux, France; Société d'Histoire et d'Archéologie, Chalon-sur-Saone, France; Bureau des Longitudes, Société Zoologique, Société Française de Physique, Museum d'Histoire Naturelle, Société de l'Histoire de France, Société Philologique, Paris, France; M. Edward Piette, Saint-Quentin, France; British Association for the Advancement of Science, Zoölogical Society, Prof. Henry Wilde, London, Eng.; Natural History and Philosophical Society, Belfast, Ireland; Royal Irish Academy, Royal Dublin Society, Dublin, Ireland; Historical and Scientific Society of Manitoba, Winnipeg; Boston Public Library, Dr. Samuel A. Green, Boston, Mass.; Free Public Library, New Bedford, Mass.; Essex Institute, Salem, Mass.; Brooklyn Library, Brooklyn, N. Y.; Buffalo Library, Buffalo, N. Y.; American Geographical Society, New York, N. Y.; Geological Society of America, Rochester, N. Y.; Pennsylvania Geological Survey, Harrisburg; Franklin Institute, Editors of the *Pionier Verein*, Mr. Frederick Prime, Philadelphia; Wyoming Historical and Geological Society, Wilkesbarre, Pa.; U. S. Naval Institute, Annapolis, Md.; Johns Hopkins University, Baltimore, Md.; U. S. Department of Agriculture, Bureau of Ethnology, American Historical Association, U. S.

Geological Survey, Washington, D. C.; Mr. C. E. Jones, Augusta, Ga.; University of Nebraska, Lincoln; Instituto Fisico-Geografico y Museo Nacional, San José, Costa Rica, C. A.; Museo de La Plata, Argentine Republic, S. A.; Ministry of Foreign Affairs, Caracas, Venezuela, S. A.; South African Philosophical Society, Cape Town; Agricultural Experiment Stations, Manhattan, Kans., Madison, Wis.

A photograph for the Society's Album was received from Mr. H. A. Hill, Boston, Mass.

A circular from the R. Accademia delle Scienze, Turin, Italy, announcing the death of its President, Prof. Comm. Michele Lessona.

The deaths of the following members were reported to the Society:

Brugsch Bey, Berlin, Prussia; died September 10, 1894, æt. 67.

Prof. Heinrich Helmholtz, Charlottenberg, Germany; died September —, 1894.

Prof. William Dwight Whitney, New Haven, Conn.; died June 7, 1894, æt. 67.

Dr. William T. Barnard, Boonton, N. J.; died May 9, 1894.

Rear-Admiral Edward Yorke Macauley, Philadelphia; died September 14, 1894, æt. 68.

Dr. Robert Peter, Lexington, Ky.; died April 26, 1894, æt. 89.

On motion, the President was authorized and requested to appoint a suitable person to prepare the usual obituary notice for the late Admiral Macauley.*

Dr. Cope presented for the *Transactions* a paper on the "Taxonomy of the Ophidia," which was, on motion, referred to a Committee of three members, to be appointed by the President.†

Prof. Cope made an oral communication in reference to a late review in the *Archiv für Anthropologie* (Braunschweig,

* Dr. Persifor Frazer was subsequently appointed.

† Drs. Ryder, Chapman and Sharp were subsequently appointed.

1893) upon his views of the ancestry of man, pointing out the errors into which the reviewer had fallen.

Pending nominations Nos. 1273, 1274, 1276 to 1301, inclusive, and new nominations 1302 and 1303 were read.

And the Society was adjourned by the President.

Stated Meeting, October 5, 1894.

President, Mr. FRALEY, in the Chair.

Correspondence was submitted as follows:

Letters of envoy were received from the K. Sächsische Gesellschaft der Wissenschaften, Leipzig, Saxony; Royal Observatory, Greenwich, Eng.; Royal Statistical Society, Zoölogical Society, London, Eng.; Musée de La Plata, Argentine Republic.

Letters of acknowledgment were received from the Geological Survey of India, Calcutta (142); Norwegian Society of Science, Throndligen, Norway (141, 142); R. Academy of Sciences, K. Statistiska Central Byrån, Prof. A. E. Nordenskiöld, Stockholm, Sweden (144); Prof. J. J. S. Steenstrup, Copenhagen, Denmark (144); Royal Society of Sciences, Prague, Bohemia (137–141); Deutsche Geologische Gesellschaft, Berlin, Prussia (142); M. Otto Böhtlingk, Leipzig, Saxony (142); Verein für Erdkunde, Metz, Germany (141); K. Sternwarte, Munich, Bavaria (144); K. Geodätisches Institut, Potsdam, Prussia (142, 144); Württembergische Verein für Handels-Geographie, Stuttgart, Germany (141, 142, 144); Naturforschende Gesellschaft, Schweiz. Naturforschende Gesellschaft Bibliothek, Bern, Switzerland (144); Société Vaudoise des Sciences Naturelles, Lausanne, Switzerland (144); Musée Guimet (142, 144); Ct. de Charencey, Marquis de Nadaillac, Dr. Edward Pepper, Paris, France (144); Mr. Samuel Timmins, Arley, Coventry, Eng. (142, 144); Philosophical Society, University Library, Cambridge, Eng. (142, 144); Sir John Evans, Nash Mills, Hemel Hempstead, Eng. (144); Philo-

sophical and Literary Society, Leeds, Eng. (144); Royal Society (142, 144), Geographical Society (144), R. Meteorological Society (142, 144), R. Astronomical Society (142, 144), Linnean Society (142, 144), Geological Society (144), Society of Antiquaries (142), Microscopical Society (142), Royal Institution of Great Britain (142, 144), Meteorological Office (144), Zoölogical Society (144), Victoria Institute (142, 144), Prof. William Crookes (142), Mr. C. Juhlin Daunfelt (142, 144), Dr. W. H. Flower (142), Sir John Lubbock (144), Col. William Ludlow (142, 144), Sir James Paget (142, 144), Sir Rawson W. Rawson (142, 144), Sir Henry Thompson, London, Eng. (142, 144); Geographical Society, Prof. W. Boyd Dawkins, Manchester, Eng. (142, 144); Natural History Society, Newcastle upon Tyne, Eng. (142, 144); Mr. Alfred R. Wallace, Parkstone, Dorset, Eng. (142); Royal Geological Society of Cornwall, Penzance, Eng. (142, 144); Dr. Isaac Roberts, Crowborough, Sussex, Eng. (144); Sir Henry Bessemer, Surrey, Eng. (144); Yorkshire Geological and Polytechnic Society, Yorkshire, Eng. (142, 144); Royal Society (142), Prof. James Geikie, Edinburgh, Scotland (142, 144); Philosophical Society, Geological Society, Glasgow, Scotland (142).

Accessions to the Library were reported from M. N. A. Cobb, Sydney, Australia; K. N. F. Universitetet, Christiania, Norway; Gesellschaft für Anthropologie, Ethnologie, etc., Gesellschaft für Erdkunde, Berlin, Prussia; Naturhistorische Gesellschaft, Hanover, Prussia; Physikalische-ökonomische Gesellschaft, Königsberg; Institut Grand-ducal, Luxemburg, Germany; Verein für Erdkunde, Metz, Germany, Société Helvétique des Sciences Naturelles, Lausanne, Switzerland; Direzione General della Statistica, Ministero di Agricoltura, Institut International de Statistique, Rome, Italy; M. G. Monret, Nicœt, France; Prof. Emil Levasseur, Paris, France; Ronsdon Observatory, Lyme Regis, Eng.; R. Cornwall Polytechnic Society, Falmouth, Eng.; Royal Observatory, Greenwich, Eng.; Lords Commissioners of the Admiralty, Linnean Society, London, Eng.; Natural History and Antiquarian Society, Penzance, Eng.; Nova Scotian Institute of Science,

Halifax; Université Laval, Quebec, Canada; Natural History Society, Montreal, Canada; Royal Society of Canada, Ottawa; Superintendent of City Trusts, Dr. D. G. Brinton, Mr. Henry Phillips, Jr., Philadelphia; Siemens and Halske Electric Company of America, Chicago, Ill.; Observatorio N. Argentino, Cordoba, Argentine Republic; Musée de La Plata, Argentine Republic.

The President reported the appointment of Dr. Persifor Frazer to prepare the obituary notice of the late Admiral Macauley.

Dr. J. Cheston Morris read a paper on "The Ethics of Solomon," as illustrated by the Book of Ecclesiastes, with a translation from the Septuagint.

Pending nominations Nos. 1273, 1274, 1276 to 1303 inclusive were read.

The Committee appointed April 20, 1894, "to consider the state of the Society," etc., made the following report.

PHILADELPHIA, October 5, 1894.

The Committee, appointed under the resolution adopted by the American Philosophical Society, April 20, 1894, "to take into consideration the state of the Society and to report whether any, and if any, what measures it may be expedient to take for increasing the resident membership of the Society, and promoting its usefulness, and whether in effectuating these purposes it may be necessary to amend the existing laws and regulations," beg respectfully to report that they have carefully considered the resolution and recommend that the following changes be made in the laws of the Society as most likely to attain the object of the resolution.

1. They recommend that Chapter I of the laws be abolished, which now stands as follows:

CHAPTER I.

OF THE MEMBERS, AND MANNER OF THEIR ELECTION.

SECTION 1. The election of members shall be by ballot, and shall form part of the stated business of the meetings on the third Fridays of February, May, October and December.

2. A member may, at any meeting, nominate in writing a candidate for membership, and the nomination so made may, in like manner, be con-

curred in by other members. The board of officers and council may also nominate candidates for membership; and such nominations shall be certified to the Society by minute thereof in writing, attested by the clerk of said board.

3. No person shall be balloted for, unless his nomination, with the names of the members proposing him, or the minute of the board of officers and council, made as aforesaid, shall have been publicly read to the Society at the two stated meetings preceding that at which the balloting takes place. Nor shall any person be deemed duly chosen unless three-fourths of the votes given shall be in his favor.

4. Before entering upon an election for members, one of the secretaries shall read the names of the several candidates; and any member may then, for the information of the Society, speak to their character and qualifications for membership.

5. The names of the candidates and their places of abode shall be designated on the ballots, and the names of the officers shall be called in the order of their seniority by the acting secretary, the members thereafter depositing their ballots. The name of a candidate struck from a ballot or not voted for shall be considered as a vote adverse to that candidate.

6. After all the other business of the meeting shall have been disposed of, the ballot box shall be opened by the secretaries, or in their absence by two tellers, to be appointed by the presiding member, who shall then declare to the Society the result of the poll.

7. The members are mutually pledged not to mention out of the Society the name of any candidate proposed, nor of any withdrawn or unsuccessful candidate; and the papers containing the names of the unsuccessful candidates shall be destroyed immediately after the election.

8. Every member, upon his introduction into the Society, shall be presented to the presiding officer, and shall subscribe the laws.

9. Such members as reside within ten miles of the hall of the Society, and such other members as desire to vote at the meetings and elections, shall pay an admission fee of ten dollars, and annually thereafter, on the first Friday of January, a contribution of five dollars. The payment of fifty dollars at one time, by a member not in arrears, shall exempt him from all future annual payments.

10. Members-elect, residing within ten miles of the hall, shall lose the right of membership unless they subscribe the laws and pay their admission fee within one year after their election. Any member liable to an annual contribution, who shall neglect or refuse to pay the same for the term of two years, shall be notified by the treasurer in writing, on or before the second Friday in January after such default, that his rights as a member are suspended; and, in case the said arrears, together with the contribution due on the first Friday in January after such notice, shall not be paid to the treasurer on or before the said last-named day, the membership of such defaulting member shall be forfeited, his name stricken from the roll, and reported to the Society by the treasurer.

11. On the Society being informed of the death of a member, the fact shall be entered on the records, and a member may be appointed to prepare an obituary notice of the deceased.

12. The obituary notices of members shall be read to the Society, and they shall be bound together whenever they are sufficiently numerous to form a volume.

That in the place of this, Chapter I shall read as follows:

CHAPTER I.

OF THE MEMBERS, AND MANNER OF THEIR ELECTION.

SECTION 1. The election of members shall be by ballot, and shall form part of the stated business of the meetings on the third Fridays of February, May, October and December.

No other business shall be transacted at such meetings until the balloting for the election of members is completed and the result thereof reported to the Society.

SECTION 2. A Committee on Nominations to consist of five members of the Society, not members of the Board of Officers and Council, shall be chosen by ballot on the third Friday of October in each year, to which Committee shall be referred all nominations of candidates for membership, and it shall consider and report from the lists of nominations so referred such persons as said Committee may deem worthy of election to membership. To make such recommendations the vote of the said Committee shall, for each person recommended, be unanimous.

The names of the persons so recommended for membership shall be posted in a convenient place for inspection in the hall of the Society for three weeks preceding the election of members.

SECTION 3. A member may, at any meeting, nominate in writing a candidate for membership, and the nomination so made may, in like manner, be concurred in by other members.

The nomination paper may contain a statement of the grounds upon which the proposed candidate is deemed worthy of membership, or may state merely his name, residence and occupation. The nomination papers shall be filed with the Secretaries and by them be immediately transmitted to the Committee on Nominations, be recorded in a book to be called the "Record of Nominations," and be reported to the Society at its next stated meeting and entered on the minutes.

SECTION 4. At the election of members at least twenty members shall be required for a quorum and any person recommended by the Committee on Nominations having a majority of the votes of the members present shall be deemed to be duly elected.

SECTION 5. The election shall be held by two tellers, to be appointed by the presiding member, who shall receive and count the votes and make report to the Society of the result of the election.

A proper number of tickets containing the names of the candidates favorably reported by the Committee on Nominations shall be printed under the direction of the Librarian, and be ready for distribution among the members at the time designated for holding the election.

SECTION 6. Such members as reside within thirty miles of the hall of the Society, and such other members as desire to vote at the meetings and elections, shall pay an admission fee of ten dollars, and annually thereafter, on the first Friday of January, a contribution of five dollars. The payment of one hundred dollars at one time, by a member not in arrears, shall exempt him from all future annual payments.

SECTION 7. Members-elect, residing within thirty miles of the hall, shall lose the right of membership unless they subscribe the laws and pay their admission fee within one year after their election. Any member liable to an annual contribution, who shall neglect or refuse to pay the same for the term of two years, shall be notified by the Treasurer in writing, on or before the second Friday in January after such default, that his rights as a member are suspended; and, in case the said arrears, together with the contribution due on the first Friday in January after such notice, shall not be paid to the Treasurer on or before the said last-named day, the membership of such defaulting member shall be forfeited, his name stricken from the roll, and reported to the Society by the Treasurer.

SECTION 8. On the Society being informed of the death of a member, the fact shall be entered on the records, and a member may be appointed to prepare an obituary notice of the deceased.

SECTION 9. The obituary notices of members shall be read to the Society, and they shall be bound together whenever they are sufficiently numerous to form a volume.

2. That Chapter II, Section 5, which now stands:

5. No one shall be esteemed a qualified voter at the election, who has not subscribed the laws and paid the admission fee, or who is in arrears to the Society, *or has not attended a meeting during a whole year next preceding the election.*

shall be amended to read as follows:

SECTION 5. No one shall be esteemed a qualified voter at the election, who has not subscribed the laws and paid the admission fee, or who is in arrears to the Society.

3. That Chapter VII (Of the Officers and Council), Section 7, which now reads:

7. The president and senior secretary of the Society shall be, ex officio,

the president and clerk at their meetings; and *three* of their number shall be a quorum.

be amended so as to read:

SECTION 7. The President and Senior Secretary of the Society shall be, *ex-officio*, the President and Clerk at their meetings; and *seven* of their number shall be a quorum.

4. To change Chapter VIII (Of the Librarian), so that Section 3, which now reads:

3. He shall attend at the library at every meeting of the Society, and daily, excepting Sundays, from *10 A.M. to 1 P.M.*, except when allowed leave of absence by the presiding officer of the Society, and shall then, and at such other times as he may think proper, lend out to any resident member of the Society, who is not indebted to him for fines or forfeitures, any books belonging to the library, except the last volumes and loose numbers of periodical journals, and except recent donations made to the Society, which shall not be lent out; taking from each member borrowing a book an obligation, with a sufficient penalty, to return the same uninjured, within one month thereafter, subject to a fine of fifty cents at every stated meeting that shall occur after the limited period before he returns the book, and a forfeiture of double the value of the book, or of the set of which it is one, if not returned in six months after being borrowed.

so that it shall stand as follows:

SECTION 3. He shall attend at the library at every meeting of the Society, and daily, excepting Sundays *and legal holidays, from 10 A.M. to 3 P.M.*, except when allowed leave of absence by the presiding officer of the Society, and shall then, and at such other times as he may think proper, lend out to any resident member of the Society, who is not indebted to him for fines or forfeitures, any books belonging to the library, except the last volumes and loose numbers of periodical journals, and except recent donations made to the Society, which shall not be lent out; taking from each member borrowing a book an obligation, with a sufficient penalty, to return the same uninjured, within one month thereafter, subject to a fine of fifty cents at every stated meeting that shall occur after the limited period before he returns the book, and a forfeiture of double the value of the book, or of the set of which it is one, if not returned in six months after being borrowed.

That Section 9, which now stands as follows:

9. He shall receive an annual salary of *seven* hundred dollars, to be

paid monthly from the treasury of the Society, and his services shall commence on the first Monday after his election.

be amended to read :

SECTION 9. He shall receive an annual salary of *nine* hundred dollars, to be paid monthly from the treasury of the Society, and his services shall commence on the first Monday after his election.

That a new section be inserted at the close of the Chapter, as follows :

SECTION 10. The library shall be closed during the months of July and August, but members desiring to use the same shall be permitted to do so under such arrangements as may be made by the Committee on the Library.

5. To amend Chapter IX, Section 3, which now stands as follows :

3. The qualified voters present at any stated or special meeting shall be a quorum, and be competent to elect members, dispose of property, appropriate money, and award premiums ; but no property shall be alienated or encumbered, except by the vote of three-fourths of the qualified voters present, and given at two successive stated meetings. For the transaction of the ordinary business, the reception and reference of communications on literary, scientific, or other subjects, all other members present shall be deemed competent to act, and, in the absence of qualified voters, shall form a quorum.

so as to read :

SECTION 3. *Twenty* qualified voters present at any stated or special meeting shall be a quorum, and be competent to elect members, dispose of property, appropriate money, and award premiums ; but no property shall be alienated or encumbered, except by the vote of three-fourths of the qualified voters present, and given at two successive stated meetings. For the transaction of the ordinary business, the reception and reference of communications on literary, scientific, or other subjects, all other members present shall be deemed competent to act, and, in the absence of qualified voters, shall form a quorum.

All of which is respectfully submitted,

FREDERICK PRIME, *Chairman.*
W. P. TATHAM,
F. FRALEY,
GEORGE H. HORN.

Mr. Prime moved that the report of the Committee be made the stated business of the meeting to be held on Friday, October 19, 1894, and that the Secretaries be directed to print and distribute the report to the resident members before the next meeting.

The motion being seconded was carried.

And the Society was adjourned by the President.

Stated Meeting, October 19, 1894.

President, Mr. FRALEY, in the Chair.

Correspondence was reported as follows:

Letters of envoy were received from the Geological Survey of India, Calcutta; Société R. des Sciences, Upsal, Sweden; K. Sächsiche Gesellschaft der Wissenschaften, Leipzig; K. Geodätisches Institut, Central Bureau der Internationalen Erdmessung, Potsdam, Prussia; Verein für Vaterländische Naturkunde in Würtemberg, Stuttgart; Academy of Science, St. Louis, Mo.

A letter was received from the R. Accademia delle Scienze, Torino, Italia, announcing the death of Ariodante Fa Cretti, one of its members.

Letters of acknowledgment were received from the Geological Survey of India, Calcutta (144); K. K. Central-Anstalt für Meteorologie, etc., Vienna, Austria (142, 144); Redaction der *Naturwissenschaftlichen Wochenschrift* (130, 134, 137); K. Akademie der Wissenschaften, Berlin, Prussia (144); Naturwissenschaftliche Verein, Bremen, Germany (142, 144); K. Sächs. Met. Institut, Chemnitz, Saxony (140, 142, 144); Geographische Gesellschaft, Hanover, Prussia (142); K. Sächs. Sternwarte (142, 144), Dr. Otto Böhtlingk, Leipzig, Saxony (144); Verein für Vaterländische Naturkunde in Würtemberg, Stuttgart (140, 141, and *Trans.*, xvii, 3, xviii, 1); Société R. des Sciences, Upsal, Sweden (137–141, and *Trans.*, xvii, 1, 2, 3, xviii, 1); Mr. Samuel Timmins, Arley, Coventry, England

(144); Royal Observatory, Edinburgh, Scotland (142, 144); Mr. Horatio Hale, Clinton, Canada (144); Bowdoin College Library, Brunswick, Me. (144); Dr. Justin Winsor, Cambridge, Mass. (142); Marine Biological Laboratory, Woods Holl, Mass. (142); State Library, Albany, N. Y. (142, 144); Prof. J. E. Oliver, Ithaca, N. Y. (144); Academy of Science, Rochester, N. Y. (144); Mr. Arthur Biddle (144), Dr. John H. Brinton (142), Mrs. Helen Abbott Michael (144), Messrs. J. G. Rosengarten (144), Julius F. Sachse (144), L. A. Scott (141, 144), Philadelphia; Prof. John F. Carll, Pleasantville, Pa. (144); Prof. J. T. Rothrock, West Chester, Pa. (144); U. S. Naval Institute, Annapolis, Md. (144); Bureau of Ethnology, Hon. William Strong, Washington, D. C. (144); Academy of Science, Austin, Texas (142, 144); University of Iowa, Iowa City (144); Agricultural Experiment Station, Manhattan, Kansas (141, 142, 144); Washburn College, Kansas Academy of Science, Topeka (144); Lieut. A. B. Wyckoff, Seattle, Wash. (144); Historical Society of Southern California, Los Angeles (144); Prof. Daniel Kirkwood, Riverside, Cal. (144); Bishop Crescencio Carrillo, Merida, Mexico (144); Observatoire Météorologique Central de Mexico, Observatorio Astronomico de Tacubaya (144); Commissao Geographica e Geologica de San Paulo, Brazil (136, 139, 140); Institute of Jamaica, Kingston (142).

Letters of acknowledgment (145) from the New Hampshire Historical Society, Concord; Vermont Experiment Station, Burlington; Rhode Island Agricultural Experiment Station, Kingston; Providence Franklin Society, Providence, R. I.; State Library, Albany, N. Y.; Agricultural Experiment Station, Geneva, N. Y.; Geological Society of America, Rochester, N. Y.; Oneida Historical Society, Utica, N. Y.; Prof. Robert W. Rogers, Madison, N. J.; Prof. Charles W. Shields, Princeton, N. J.; Dr. Charles B. Dudley, Altoona, Pa.; Prof. Lyman B. Hall, Haverford, Pa.; Mr. P. F. Rothermel, Linfield, Pa.; Dr. Persifor Frazer, Prof. H. D. Gregory, Philadelphia; Mr. Thomas Meehan, Germantown, Philadelphia; Enoch Pratt Free Library, Maryland Institute, Peabody Institute,

Baltimore, Md.; Mr. T. L. Patterson, Cumberland, Md.; U. S. Geological Survey, Library Surgeon General's Office, U. S. Weather Bureau, Messrs. John S. Billings, W. J. Hoffman, Garrick Mallery, Charles A. Schott, William B. Taylor, Washington, D. C.; University of Virginia, Leander McCormick Observatory, Prof. J. W. Mallet, University of Virginia, Va.; Mr. Jedediah Hotchkiss, Staunton, Va.; Agricultural Experiment Station, Raleigh, N. C.; Georgia Historical Society, Savannah; Newberry Library, Chicago, Ill.; Rantoul Literary Society, Rantoul, Ill.; State Historical Society, Iowa City; Prof. E. W. Claypole, Akron, O.; Cincinnati Observatory, O.; Journal Comparative Neurology, Granville, O.; Oberlin College Library, O.; Purdue Experiment Station, LaFayette, Ind.; State Historical Society of Wisconsin, Academy of Sciences, etc., Madison; Kansas Academy of Science, Topeka; University of California, Prof. Joseph Le Conte, Berkeley, Cal.; Historical Society of Southern California, Los Angeles; Lick Observatory, Mt. Hamilton, Cal.; Prof. Daniel Kirkwood, Riverside, Cal.; Nebraska State Historical Society, Lincoln; Colorado Scientific Society, Denver; University of Wyoming, Laramie; South Dakota Agricultural College, Brookings; Academy of Science, Tacoma, Wash.; Bishop Crescencio Carrillo, Merida, Mexico; Observatorio Astronomico Nacional, Don Mariano Barana, Mexico, Mex.

Accessions to the Library were reported from the New Hampshire Historical Society, Concord; Dr. Samuel H. Scudder, Mr. Andrew McFarland Davis, Cambridge, Mass.; Connecticut Historical Society, Hartford; Yale University, New Haven, Conn.; University of the State of New York, Albany; Academy of Sciences, Scientific Alliance, Profs. J. A. Allen, W. LeConte Stevens, Mr. James Douglas, New York, N. Y.; Academy of Science, Rochester, N. Y.; Pennsylvania State College, Harrisburg; College of Pharmacy, Oriental Club of Philadelphia, Messrs. MacCalla & Co., Mrs. Wistar, Philadelphia; Peabody Institute, Baltimore, Md.; U. S. Department of Agriculture, Treasury and War Departments, Washington, D. C.; Law School of Mercer University, Macon, Ga.; Uni-

versity of California, Berkeley; University of Wisconsin, Madison; Historical Society, Lincoln, Neb.; Geological Survey, Minneapolis, Minn.; Observatorio Astronomico y Meteorologico, San Salvador, Central America; Sociedad Cientifica Argentina, Dr. Estanislao S. Zeballos, Buenos Aires, South America; Observatorio Nacional Argentina, Cordoba, South America.

The death of Dr. Oliver Wendell Holmes (Boston) was announced, October 7, 1894 (æt. 86).

The proposed amendments to the Laws of the Society were taken up.

The Librarian stated that public notice had been given in the newspapers that the Society would consider same at this meeting, and furthermore, that printed copies of the said amendments had been sent to the members before the date of the meeting, and that the quorum required by the Laws was present.

Mr. Prime moved to consider Sections 1 to 5, Chapter I, inclusive, together. The motion was carried.

Mr. McKean moved to amend paragraph 2 of Section 1, to strike out "no other business shall be transacted at such meeting until the balloting for the election of members is completed and the result thereof reported to the Society," and to substitute instead at end of 1st paragraph, "and it shall have priority over all other business until the balloting be completed."

The President stated that, agreeably to the custom of the Society, if any amendments were agreed to, that the Law so amended must lie over for two weeks.

Mr. McKean's motion was put and carried.

Mr. McKean moved to strike out the words "not members of the Board of Officers and Council" from Section 2.

Mr. McKean moved to amend the same section by striking out the words "be *unanimous*" and inserting instead "there shall be an affirmative vote of at least *three* members of the Committee."

The members discussed the question of public posting of names in the Society's Hall.

Mr. Prime submitted the following substitute for Section 2:

SECTION 2. A Committee on Nominations to consist of six members shall be chosen by ballot at the Stated Meeting of the Society, to be held on the third Friday of November, 1894, of whom two shall serve for one year, two for two years, and two for three years, and annually thereafter on the third Friday in November, two members of said Committee shall be chosen by ballot to serve for three years, but the retiring members shall not be eligible for re-election, until a year from the expiration of their office. Any member not attending a meeting of the Committee for six months shall be deemed to have vacated his office. Vacancies in this Committee occurring from any cause whatever, shall be filled by appointments made by the President of the Society, or if there be no President in office, then by the senior Vice-President. To this Committee shall be referred all nominations of candidates for membership, and it shall consider and report from the lists of nominations so referred, such persons as said Committee may deem worthy of election to membership.

To make such recommendations, the vote of at least four members of said Committee shall be required. The names of the persons so recommended for membership shall be posted in a convenient place for inspection in the Hall of the Society for three weeks preceding the election of members.

Members spoke to the amendment.

Mr. Prime called for a vote on his amendment.

Dr. Cope offered the following amendment: "That a vote of three members of the said Committee shall be a majority."

The vote was taken on Mr. Prime's motion, and it was carried by 18 ayes, 4 nays.

Then on Mr. Prime's amendment, which was lost, ayes 9, nays 11.

The amendment of Dr. Cope was put and carried, ayes 12, nays 6.

Dr. Greene moved that, it is the sense of the Society that it is inexpedient to make any change in the method of electing its members, then withdrew the same and offered a resolution to postpone the further consideration of the amendments in order to introduce the above motion.

The motion was lost, 10 ayes, 11 nays.

Mr. McKean moved to strike out the words "not members of the Board of Officers and Council," which was debated and carried by a vote of 18 ayes and 8 nays.

Dr. Morris moved to strike out second paragraph of Section 2, and substitute as follows:

All nominations shall be open to inspection by members of the Society when the Hall is open, under charge of the Secretaries.

The Committee on Nominations shall hold stated meetings on the second Fridays of January, April, September and November, when those interested may state their reasons for or against any candidate: but the members of the Society are mutually pledged not to mention out of the Society the name of any candidate proposed, nor of any withdrawn or unsuccessful candidate: and the papers containing the names of unsuccessful candidates shall be destroyed immediately after the election following.

Dr. Cope moved that the words "the names of the persons so recommended for membership shall be placed in a convenient place for inspection in the Hall of the Society for three weeks preceding the election," be struck out.

Mr. Prime explained the reason of the paragraph.

Dr. Brinton moved to adjourn. The motion was lost ayes 7, nays 14.

The question being taken on Dr. Cope's motion, it was carried.

Dr. Greene moved to indefinitely postpone action on the amendments.

Mr. Prime moved to make the amendments prepared by the Committee the stated business of the next regular meeting.

It was moved to adjourn. Carried, ayes 17.

And so the Society was adjourned.

Some Coal Measure Sections Near Peytona, West Virginia.

By Benj. Smith Lyman.

(*Read before the American Philosophical Society, November 2, 1894.*)

Some results of a couple of rough surveys made in 1872, near Peytona, Boone Co., W. Va., though without any addition from later observations, may be a useful contribution towards the elucidation of the geology of that region. The graphic comparison of columnar sections there with Prof. J. J. Stevenson's careful general section in the northern edge of that State, as published, without any diagram, in our *Transactions*, Vol. xv, p. 15, 1872, shows a remarkable general agreement, considering the great distance. The present sections also help very much in the identification of the different coal beds of the region, hitherto insufficiently studied, as remarked by Prof. I. C. White, in his valuable "Stratigraphy of the Bituminous Coal Field of Western Pennsylvania, Ohio and West Virginia," *U. S. Geol. Surv. Bulletin*, No. 65, p. 148, 1891.

It will be well to indicate first, with some precision, the situation of the tracts surveyed, and then briefly their main topographical features; before giving the geological details of the general structure and of the special observed facts, and pointing out the remarkable agreement of the resulting columnar sections with the distant northern section, and discussing the identification of beds that is consequently to be inferred.

SITUATION.

The accompanying small map shows in a general way the situation of the two tracts and their relative position.

One of the surveys covered the tract owned by the Peytona Cannel Coal Company, at Peytona, on Coal River, thirty-five miles above Coalsmouth (or St. Alban's), on the Kanawha, and about twenty-two miles by road south of Charleston, the State capital, and twelve miles southerly from Brownstown. It is a tract of 6137 acres, in the shape nearly of an oblong square about five miles long by a mile and three-quarters wide, with the long sides running about northeast.

The other survey covered the two Parker tracts on Lens Creek (marked as Callacham's Creek, on some maps), both together about 6500 acres, and somewhat in the shape of a leg of mutton, or of a rather one sided oak leaf, with the stem of the leaf or smaller end about a mile southwest of the mouth of the creek, near Brownstown, on the Kanawha, ten miles above (southwest of) Charleston, and with the eastern side running in a sinuous course southerly about three miles and a half, and the western side mainly following the course of the creek. The southwestern corner is about four miles northeast of Peytona.

LAY OF THE LAND.

The land of both surveys has the same general topographical character that is found under like geological conditions throughout so large a region in West Virginia and western Pennsylvania, namely, very steep, often cliffy, hillsides and narrow valleys, with the hills rising 800 to 900 feet, or even more to summits that are mostly narrow, here and there even sharp, but in some places broad and flat, and with narrow strips of nearly flat land, up to a couple of hundred yards in width, along the lower and comparatively level parts of the streams. The lowest points in each survey are some 600 feet above sea level.

The Peytona tract is drained by Coal River, flowing westward across its northern end, and in the central part by Indian Creek, flowing northerly, the western edge by the eastern branches of Droddy's Creek, up as far as its Lick Fork at the southwest corner; and the southern corner by the head waters of the Sandy Lick Fork of Laurel Creek.

On the Parker tract, the lower part of Lens Creek, from its forks northeastward three-quarters of a mile to its mouth forms the stem of the oak-leaf shape, and the midrib of the leaf is the left fork of Lens Creek, with long side ribs and veinlets on the western side, and shorter ones on the east. A narrow strip besides is added along the west, containing the most eastern branches of the right fork of Lens Creek, which forms the western boundary. Both forks fall only fifty or sixty feet to the mile for four miles above their union; but above that much more rapidly.

GEOLOGY.

STRUCTURE.—The geological structure that occasions the peculiar topographical character, with flat, table-like hilltops here and there, with flat valleys and with many cliffs on the almost uniformly abrupt hillsides is, of course, the very level bedding of a great thickness of rocks at a sufficient height above sea-level.

In the northern part of the Peytona tract, the rock beds seem to lie pretty regular, with the very gentle dip of 1 to 102, or 51¾ feet to the mile, southeasterly, and the strike of N. 14½° E. The same dip and strike perhaps continue throughout the southern part of the tract, but the lack of surveys there leaves this point uncertain. There are slight local variations from the general dip causing "swamps" in the mines, say one hundred yards across, and sinking, say, one or two feet; such swamps, however, as are common to all our western, flat-lying coal measures.

On the Parker tracts the dip is so slight that without much careful leveling it would be impossible to tell exactly what it is, or whether it is the same throughout the tracts. It seemed at the time of the survey and of drawing the map, to be in general uniform throughout them, and to be towards the north-northeast (N. 20° E.) about one foot in 78, or 68 feet to the mile. But there are local variations of the dip here, too, extending a few hundred yards, or at least "swamps" in the coal beds, depending on the varying thickness of the rock-layers.

It now seems, however, not improbable that the strike lines, drawn straight and parallel on the two large maps throughout the tracts of each survey, should have been gently curved as indicated by the lines of shading of the two surveys on the accompanying little map of their general situation, making the strike curves of one survey conform, by gradual transition, to those of the other, and to correspond with the northwesterly dip that is said to prevail at Coalburg, on the opposite, southeasterly side of the broad, shallow basin. The strike curves on Lens Creek would then be gently convex towards the northeast, and those of Peytona would be slightly so towards the east. Nevertheless, this little change would not affect the principal results of the surveys, nor the identification of the beds.

ROCK-BEDS.—The following is a general section downwards of the rocks exposed on the Peytona tract, so far as known:

		FT.	IN.
Partly hidden, but chiefly sand rock and shales	about	155	0
Gray clay	"	1	0
COAL, *Pittsburgh Bed*, with some slate	"	4	0
Hard fireclay and sand rock and shales	"	23	0
COAL, bituminous, soft	"	0	4
Fireclay and hidden, but no doubt mostly sand rock and shales	"	85	0
COAL, bituminous	"	0	4
Fireclay and hidden, but no doubt mostly sand rock and shales	"	90	0
Bony COAL	"	0	3
Hidden, but no doubt chiefly sand rock and shales	"	55	0
COAL, bituminous, with two feet of fireclay in the middle	"	5	0
Hard, gray sand rock and hidden, but doubtless mostly sand rock and shales	"	120	0
COAL, bituminous	"	0	6

		FT.	IN.
Hidden, but no doubt chiefly sand rock and shales about		13	0
Black slate	"	0	4
COAL, bituminous	"	0	2
Shale, or slate	"	0	4
Sand and bituminous coal mixed	"	0	9
Iron ore (carbonate)	"	0	$0\frac{1}{4}$
Slate and sand rock mixed	"	0	8
Black slate	"	0	5
Cannel slate ("bastard cannel")	"	0	1
Slate	"	0	1
Fireclay	"	0	2
Cannel slate ("bastard cannel")	"	0	$1\frac{1}{2}$
Fireclay	"	0	2
COAL, *Upper Cannel*, all "smooth cannel"	"	2	6
Cannel slate ("bastard cannel"), with fossil shells	"	0	$2\frac{1}{4}$
Sand rock and sandy shales	"	15	0
Slate	"	0	6
Iron ore	"	0	$0\frac{1}{2}$
Slate and iron ore mixed	"	1	0
Iron ore	"	0	0
Slate	"	0	10
Shale	"	0	4
Cannel slate	"	0	2
Fireclay	"	0	2
COAL, *Main Cannel*, partly bituminous	"	2	10
"Slate"	"	1	0
"Bastard cannel"	"	0	5
"Slate"	"	1	0
"COAL," bituminous	"	0	7
Hidden, but no doubt mostly sand rock and shales	"	89	0
COAL, *Shoot Bed*	"	3	6
Hidden, but doubtless chiefly sand rock and shales	"	17	0
Sand rock	"	4	0
Sandy shales	"	2	0
COAL, *Blacksmith Bed*	"	2	0
Fireclay and brownish gray sand rock	"	6	0
Sand rock and shales	"	37	0
Brown shales with small iron-ore balls	"	20	0
Black slate	"	0	3
Shales and sand rock	"	27	6
Sand rock, very cross bedded, brownish gray	"	9	0
COAL, bituminous	"	0	3
Sand rock, brownish gray, Penna. Formation No. XII			
		800	0

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The following is a general section downwards of the rocks exposed on the Parker or Lens creek tracts, so far as known :

		FT.	IN.
Gray sand rock	about	8	0
Hidden	"	30	0
COAL, *Pittsburgh Bed*, 4,, 9 to 5,, 6, say	"	5	0
Hidden	"	44	0
Brownish-gray sand rock	"	4	0
Hidden	"	14	0
Slates	"	6	0
COAL, *Slate Vein*, in two or three thin layers separated by much clay, the upper one cannel, average, say	"	3	0
Hidden	"	190	0
Brownish gray sand rock	"	5	0
Hidden	"	105	0
COAL, *Wood's Upper Bed*, with commonly about half an inch of clay at about six inches below the top, 2,, 6(?) to 4,, 0, average, say	"	3	0
Hidden	"	7	0
Brownish-gray sandy shales and sand rock	"	37	0
COAL, *Factory Bed*, 0,, 9 to 3,, 8, with about two thickish layers of clay, average	"	3	0
Brownish-gray sandy shales	"	21	0
Hidden	"	20	0
Brownish-gray sand rock	"	10	0
Hidden	"	4	0
Brownish gray sand rock	"	12	0
COAL, *Wood's Lower Bed*, commonly with a half-inch seam of clay about five inches above the bottom, 3,, 3½ to 4,, 0½, average, say	"	3	8
Slate floor of coal and hidden	"	22	0
COAL, a very thin seam, say	"	0	4
Black slate	"	2	0
Hidden	"	24	0
Brownish-gray sand rock	"	12	0
Hidden	"	6	0
Brownish-gray sand rock	"	5	0
Brownish-gray sandy shales, sometimes with small iron ore balls	"	15	0
COAL, *Jerrold's Bed*, with sometimes a half-inch layer of clay at about nine inches below the top, sometimes one near the bottom also ; 2,, 8, or even less to 3,, 6, average, say	"	3	0
Brownish-gray sandy shales	"	14	0
COAL, *Vicker's Bed*, perhaps	"	2	0
		640	0

COAL OPENINGS.

PITTSBURGH COAL.—The Pittsburgh coal bed has been opened at only one place on the Peytona tract or in the neighborhood; and that was near the top of the mountain above the mines and east of them. The section measured there was as follows, from above downward:

	FT.	IN.	FT.	IN.
Loose sandstone blocks, somewhat limy?				
Sand rock, thick				
Hard gray clay	1	0		
Good COAL	0	11½		
Slate	0	2		
COAL and slate mixed	1	4		
Slate	0	2		
Good COAL	0	8½	4	0
Slate	0	3½		
COAL	0	0½		
Slate	0	1		
Good COAL	0	3		
Fireclay				
	5	0		

The coal bed contains, then:

	FT.	IN.
Good coal	1	11
Slaty coal	1	4
Slate	0	9
	4	0

That is, however, so much inferior both in thickness and in quality to what the same bed is even as near as Lens Creek, and still more to what it is in the northern part of the State, that it seems not unreasonable to hope that its average throughout the tract may prove better than at this opening.

On Lens creek the bed forms but small patches on the hilltops, and has (1872) been opened in only one place, namely, on the hill opposite Mrs. Nuby's house and King's Hollow, about the middle of the eastern edge of the map; with the following section, from above downward:

	FT.	IN.
Loam, with crop-coal		
COAL	1	9
Clay	0	6
COAL, with half-inch layers of clay at about four and six inches from the bottom, and perhaps at about a foot and a foot and a half from the bottom	3	4
	5	7

The opening is not a very perfect one, and perhaps does not show the

full thickness. The quality is only imperfectly shown, as the coal dug had no solid cover and is all mere crop-coal, yet seems to be good.

The bed has been worked at Curry's mine, in Church Hollow, about one hundred yards outside the Parker tracts, and just outside the northeastern corner of the Lens Creek map; with the following section from above downward:

	FT.	IN.
Sand rock		
COAL	1	5
Gray slate	0	2
COAL	3	2
Fireclay		
	4	9

The SIX-INCH BITUMINOUS COAL bed about twenty-three feet below the Pittsburgh bed at Peytona, was opened in June, 1872, on the lumber slide above the No. 1 Entry of the old Peytona mines.

The FOUR-INCH SOFT, BITUMINOUS COAL bed about one hundred and ten feet below the Pittsburgh bed, at Peytona, was opened in June, 1872, on the lumber slide above the No. 1 Entry of the old Peytona mines, with a fine-looking bed of fireclay partly exposed below.

SLATE VEIN.—The slate vein on Lens Creek was opened by an old drift, near Curry's coal mine in Church Hollow, just outside the northeast corner of the map; and measured as follows, from above downward:

	FT.	IN.	FT.	IN.
Slates, exposed some	6	0		
Coal, cannel	1	2		
Black slate	1	0	3	5
COAL, soft, bituminous, more than half under water, about	1	3		
	9	5		

The same bed was also opened in June, 1872, on the hillside up the hollow opposite Mrs. Nuby's house and King's Hollow on the Left Fork of Lens Creek, below the opening of the Pittsburgh bed there; and measures as follows, from above downward:

	FT.	IN.
Clay, gray, perhaps not in place		
COAL, cannel, slaty	0	8
Brown slate or clay, with a little coal	0	5½
Coal, bituminous	1	0
Gray clay	0	5½
COAL, bituminous	0	8
	3	3

The THREE-INCH BONY COAL about two hundred feet above the upper cannel coal bed was opened above Entry No. 4, at Peytona, in 1872; but only showed two or three inches of bony crop-coal, or crop-cannel, or perhaps merely crop-slate.

The THREE-FOOT BITUMINOUS COAL bed about one hundred and forty feet above the upper cannel on the Peytona tract, has been partially opened above Entry No. 4, with the following section from above downward:

		FT.	IN.
Loam	about	2	0
Crop-COAL, splint-like		1	0
Fireclay		1	5
COAL, bituminous, firm and good		2	6
		6	11

It may prove workable in some places, but cannot probably be counted on as such throughout the tract. It is most likely the same as a bed of unworkable thickness that has been opened on the waters of Indian creek, either the "Third Cannel," in Abshire's Hollow and on Meadow's Fork (a bed yielding there about seven inches of cannel at the bottom with bituminous coal above it), or a thin bed of bituminous coal said still more to resemble it, formerly opened some twenty feet higher up, on Meadow's Fork.

The SIX-INCH BITUMINOUS COAL some twenty feet above the upper cannel was opened on the top of the point on the south side of Droddy's Creek, near the western edge of the map; and is said to have been six inches thick, pretty firm, but not splint-like, without solid roof, but about two feet of rather hard clay above it. The same bed shows about three inches of outcrop, without solid roof or floor, about thirty-two feet above the bottom of Entry No. 4, of the Peytona mines and on the north side of the hollow.

UPPER CANNEL.—The thicknesses of the beds in the general section within three or four feet above the Upper Cannel bed are the means of measurements at two places; except that the thickness given for the principal cannel bench is the average of four measurements near the mines. That bench, however, is still more variable hereabouts. It has been worked at the Peytona mines by a short drift, on which it measures twenty-seven inches and about thirty-one inches; and has also been opened by a slope from the Main Cannel bed and measures there twenty-one inches.

On Abshire's Branch of Indian Creek, half a mile southeast of the Peytona mines, the same bed is opened in several places, and at one of them measures as follows, from above downward:

		FT.	IN.
Slate			
COAL		0	6
Brownish-gray sand rock	about	3	6
Brown shales	"	1	6
Cannel COAL	"	1	11
Shales, exposed	"	0	3
		7	8

At another opening, about two hundred yards further up the branch and on its north side, the following section with the same bed is exposed from above downward:

	FT.	IN.
COAL, bituminous, "hard," merely the tail of the outcrop	0	9
Slate	2	0
Cannel COAL	1	3
	4	0

At an opening about thirty yards distant on the south side of the branch the Upper Cannel is about ten inches thick, but it is only the tail of the outcrop not well roofed over.

An opening was made on the Upper Cannel in June, 1872, back of John McCarty's house on Droddy's creek, in the western edge of the tract, and gave the following section from above downward:

		FT.	IN.
Sand rock, massive	about	2	0
Shales	"	3	0
COAL, soft, rotten, bituminous	"	0	6
Clay	"	0	6
Black slate	"	0	$0\frac{1}{4}$
CANNEL, the upper inch perhaps a little bony	"	3	$2\frac{3}{4}$
		9	3

The Upper Cannel was also opened in 1872 on the hillside over the blacksmith's shop on Droddy's Creek, half a mile northwesterly from the mines, and measures but $10\frac{1}{2}$ inches, of which only the upper nine-eighths of an inch are cannel or cannel slate, the rest all bituminous; but there was only clay and loam above, without any solid roof.

The quality of the cannel coal of this bed at Peytona is very good, though not quite equal to the remarkably fine coal of the Main Cannel bed.

On Lens Creek the Upper Cannel coal bed is of different character, but is beyond question the bed called there Wood's Upper Coal. It seemed in 1872 to have been worked only at Wood's upper mine on King's branch, where it was opened by a drift about twenty feet long in the winter of 1869 and 1870, with the following section from above downward:

		FT.	IN.
COAL, bituminous, softer	about	0	9
Clay	"	0	$0\frac{1}{4}$
COAL, bituminous, hard, "splint"	"	2	8
		3	$5\frac{1}{4}$

It was not then fully accessible on account of water dammed back by fallen earth at the mouth.

The same bed was imperfectly opened at the head of Big Hollow, in 1872, with the following section from above downward :

		FT.	IN.	FT.	IN.
Loose clay and shaly wash	about	2	0		
COAL, much weathered, rather hard	"	0	6	3	9
Clay	"	0	0½		
COAL, hard and firm, but weathered	"	3	2½		
Black slate, exposed	"	0	1		
		5	10		

The same bed was opened in 1872 on the very steep hillside on the south side of Schoolhouse Hollow, near the middle of the east edge of the map, with the following section from above downward :

		FT.	IN.	FT.	IN.
Slate roof exposed	about	2	0		
COAL, softer	"	0	5½	3	3¾
Clay	"	0	0¼		
COAL, hard, "splint"	"	2	10		
		5	3¾		

Floor, said to be slate, two inches under water.

Another opening made on the same bed in 1872, on Bee Branch, near the southern edge of the map, gave the following section from above downward :

		FT.	IN.	FT.	IN.
Slate	about	1	0		
COAL, rather soft	"	0	4½	3	3
Clay	"	0	1		
COAL, bituminous, hard, "splint"	"	2	9½		
Brownish-gray, fine, hard sand rock	"	1	0		
		5	3		

A rather imperfect opening made on the same bed in 1872 nearly opposite Nuby's house on the left fork of Lens Creek had the following section from above downward :

No roof but loose material, mostly brownish-gray sandstone blocks.

	FT.	IN.
COAL, bituminous	0	3½
Gray clay	about 0	1½
COAL, bituminous	2	1
Bony COAL	0	6
COAL, bituminous	0	6
	3	6

Another opening on the same bed made imperfectly in 1872 at Perfater's Spring, on a small branch of the left fork of Lens Creek, nearly

south of Lavender's house, gave the following section from above downward:

No roof but wash.

	FT.	IN.
COAL, slaty.....about	0	1
COAL, with half an inch of clay about the middle, "	0	11
Hard fire clay.		
	1	0

The spring is only about three feet distant. Its water is called good, but said to taste a little sulphury.

It is probably the same bed that was very poorly opened in 1872 rather high up the hillside in Peels' Hollow, with the following section from above downward:

Wash loam.	FT.	IN.	FT.	IN.
COAL.....	0	$3\frac{1}{2}$		
Clay.....	0	$1\frac{1}{4}$		
COAL.....	1	$6\frac{1}{2}$	2	2
Clay.....	0	$0\frac{3}{4}$		
COAL.....	0	2		
Clay, exposed.....about	0	6		
	2	8		

The coal is only bituminous, and nothing but dirty crop-coal, and so not of very good appearance.

The bed was also opened in 1872 near Asa Ferrel's house, and near the southwest corner of the map, just above the so-called Ferrel's coal opening on the Factory Coal Bed, or the Peytona Main Cannel, and had the following section from above downward:

Roof, not solid.	FT.	IN.
Coal, bituminous, "splint"	0	6
Fireclay	0	6
Coal, bituminous, "splint".....	1	6
	2	6

The coal of Wood's Upper Bed is bituminous, of very fine quality, especially the main bench, below the seam of clay. The main bench is a remarkably firm splint coal, extremely well suited for steam purposes or domestic fires, or probably even for burning raw in iron furnaces. It is easily mined in large blocks that bear rough handling extremely well. A fair specimen of it was assayed in 1872 by the very able chemist, Dr. George A. Koenig, and yielded:

Coke	68.35
Gas.....	23.25
Ashes (gray).....	6.45
Hygroscopic water.....	1.95
	100.00

The coal seems to be very free from sulphur. The thin upper bench is less firm than the main one. This bed is undoubtedly the one described in the following extracts from a report on these tracts by the celebrated Professor James Hall (1854), as quoted in the pamphlet of the St. George Mining and Manufacturing Company, New York, 1865, page 7:

"This bed was first opened on the point of a low hill in the rear of Mr. Vickar's house, as shown on the map. At this point it is three feet ten inches thick. Although in a most exposed situation, and covered only by a slight thickness of clay, the coal was quarried out in blocks of large size, and breaking into smaller masses only by the application of considerable force.

"The aspect of the coal is that of a laminated cannel coal with thin seams of bituminous coal intervening, but altogether forming a small part of the whole. On burning this coal side by side with the cannel coal from the bed previously mentioned, there was a remarkable similarity in the color and character of the flame, the amount of smoke and the ash. The coal burns with much white, or yellowish-white flame, without decrepitation, and with a small quantity of smoke. It maintains its form, showing no disposition to melt or run, and in the process of burning, throws out numerous jets of white flame, in addition to the steady burning flame. When partially burned, it presents a fine porous coke, finally burning away to a white or light-colored ash, without, in the cases tried, any appreciable quantity of slag or other impurity. The flame and quantity of smoke from a piece of cannel coal burned at the same time and by the side of this coal were not perceptibly different.

"From this little experiment, twice repeated at the locality, I infer that for all purposes for producing steam, or for a steady, dry-burning, blazing coal, the coal from this bed will answer all the purposes of the real cannel coal, and for these objects will be equally valuable. The only advantage possessed by the cannel coal for domestic use is that of its freedom from soiling in the process of handling. I am inclined, therefore, to regard this bed of coal as of very great value, particularly upon the western rivers, and for the steam boilers of all manufactories where the prevailing coals are of the soft, bituminous character.

"I may mention that such is the indestructibility of this coal from ordinary atmospheric agencies, that large fragments may be picked up in the beds of the streams half a mile from the coal in place, and the specimens burned were of such samples which had lain exposed to the weather probably for centuries. I need scarcely mention that from this remarkable indestructibility of the coal from the agency of the weather and from its breaking out in large blocks, even on the exposed outcrops, it is remarkably adapted to bear transportation with little loss from breaking or waste.

"This combination of qualities, which I hesitate not to say is possessed by no other coal in this region, except the cannel coal, renders it extremely valuable to any parties who propose to mine and send coal to market."

The bed seems to thin out, not only southwestward towards Peytona, but northwestward towards the Kanawha; for near the river it measures but 2 feet 10 inches in one place, and would seem to be much less than that in Church Hollow and thereabouts. At the few points, however, where fully opened on the Parker tracts, it seems to be of good workable thickness; and the bed seems to have its greatest size just here, and to be in general little noticeable everywhere else in the neighborhood.

The "bastard cannel" at the bottom of the upper cannel coal bed, at Peytona, contains numerous fossil shells.

MAIN CANNEL.—The Main Cannel coal bed had, in 1872, been worked for twenty years or more at the Peytona mines and near them, as well as at the adjacent mines of the Western Mining and Manufacturing Company. Seven measurements of the coal at different parts of the Peytona mines give the following section of the bed from above downward;

	FT.	IN.	FT.	IN.
Smooth cannel, 1,, 8 to 2,, 1, average, about	1	10	2	6
Curly (or birds'-eye) cannel, 0,, 0 to 1,, 6	0	8		
Bituminous coal, 0,, 0 to 0,, 8	0	4	0	4
	2	10	2	10

After those measurements were made, another part of the mine yielded cannel, both kinds together, 3 feet 5 inches thick, the lower 17½ inches being curly and the rest all good cannel.

An opening on the river front of the hillside over Halsted's farm about three-quarters of a mile northeast of the mines shows the following section from above downward:

	FT.	IN.	FT.	IN.
Brownish-gray slate, about	8	0		
Wild cannel or very bony cannel, or cannel slate	0	1		
Clay	0	1		
CANNEL, the lower inch a little mixed with bituminous coal	0	5		
COAL, bituminous, very hard	0	9		
Clay	0	1	1	11
COAL, bituminous, very hard, somewhat resembling "curly cannel"	0	7¼		
	10	1¼		

In Abshire's Hollow, about half a mile southeast of the mines, the bed is opened, with the following section from above downward:

	FT.	IN.
Smooth CANNEL	0	3
COAL, hard bituminous	0	11
Smooth CANNEL	0	10
	2	0

An opening near Droddy's Creek, about three-quarters of a mile northwesterly from the Peytona mines, gives the following section from above downward :

	FT.	IN.
CANNEL, slaty	0	6
COAL, bituminous	0	3
COAL, bituminous, resembling "curly cannel"	1	1
COAL, bituminous	0	6
	2	4

Near John McCarty's house on Droddy's Creek, about twenty feet below the opening on the Upper Cannel, there is an old opening quite fallen in that must have been on the Main Cannel ; but its coal is said to have been "bituminous mixed with cannel."

The smooth cannel is cannel proper ; the curly cannel is an intimate mixture of cannel coal and bituminous. The curly is more highly prized, as it makes the best coal for domestic use. The quality of both kinds is remarkably pure. Besides the very great merits of the coal for domestic purposes, it is very valuable for making gas, owing to the large yield and high candle power of the gas ; and the coal is therefore used as an "enricher" with bituminous gas-coal.

The following are the results of an assay of the Peytona cannel coal, as reported by the Manhattan Gas Light Company of New York, in 1869 :

"Maximum yield of gas per ton of 2240 pounds—13,200 cubic feet of 32.66 candle power.

"At 10,000 feet per ton (standard yield) the illuminating power of the gas is equal to 41.16 candles.

"Yield of coke per ton, 32 bushels, weighing 1380 pounds.

"One bushel of the hydrate of lime purifies 4510 cubic feet of gas.

"Analysis of the coal :

"Volatile matter	46.00
"Fixed carbon	41.00
"Ash	13.00
	100.00"

The cannel coal of the Main Bed has in some parts of the mine red ash, and in some parts white ash. At one place there is what they call "gummy coal" or "gum," red and white, said to be liquid when fresh, like syrup, thinner than cold molasses. Some of it when gathered dry in the mine looks like a rotten coal, and some of it like a bituminous powder.

In mining, the bituminous coal was thrown aside in the mine, and left there.

This bed is the same as the Factory Cannel Coal Bed of Lens Creek, but much superior to it in quality, as well as thickness, at the Peytona mines. It is a very irregular bed both in thickness and quality, and its unusual

merits in these respects at Peytona gave especial value to the deposit there.

The Factory Cannel Coal Bed was the most widely known of all the coals on Lens Creek, and is the one formerly worked at the old oil factory on the Left Fork. The section there, at about twenty-five yards inside the middle one of three drifts, is as follows, from above downward :

	FT.	IN.	FT.	IN.
Coal, bituminous	0	6	3	8½
Black slaty clay	0	9½		
Cannel	2	5		
Black iron ore .....about	0	3		
	3	11½		

The bench of cannel however is said to yield only 1 foot 6 inches of good cannel, the rest being "wild cannel" or cannel shale.

The same bed was imperfectly opened in 1872 nearly opposite Nuby's house on the Left Fork of Lens Creek and had the following section from above downward :

	FT.	IN.
No solid roof.		
Cannel, partly good, partly slaty, all rather poor looking.....about	3	0
Black carbonate of iron	0	2
Brownish-gray sand rock, at least	20	0
	23	2

The coal looks rather less pure than the Peytona mine cannel, but that is perhaps owing to its being merely crop-coal. The thickness, too, could not be properly measured without a firm roof.

The bed was opened also in 1872 near the schoolhouse of the Left Fork, with the following section from above downward :

	FT.	IN.	FT.	IN.
Shaly sandrock.....about	22	0		
Black clay..... "	0	1		
Coal..... "	0	1		
Black clay..... "	0	1		
Sand rock..... "	2	0		
Gray shales..... "	12	0		
Black soft slate..... "	0	6		
Coal, bituminous	0	4½	0	9
Clay	0	1		
Coal, bituminous	0	3		
Bright cannel	0	0½		
Gray slaty clay	1	6		
Shaly sand rock.....about	10	6		
	56	6		

The same bed apparently was imperfectly opened in 1872, near the head of Stewart Branch, and had the following section from above downward :

		FT.	IN.
Loam, no firm roof	about	2	0
Clay, mixed with coal slate, outcrop	"	0	6
Fire clay	"	1	6
Coal, bituminous		0	7
		4	7

The same bed was imperfectly opened too, in 1872, in Locust Hollow, east of the Right Fork, and had the following section from above downward :

		FT.	IN.
No true roof, but clay and wash	about	2	0
Crop-coal		0	7
Clay and wash		0	6
Coal, bituminous		1	5
Fireclay	about	0	1
Coal, bituminous		0	7
		5	2

The same bed was well opened in 1872, above Asa Ferrel's house, near the southwest corner of the map, with the following section from above downward :

	FT.	IN.	FT.	IN.
Gray and brown shales	2	5		
Hard black slate	0	1		
Gray and brown shales	0	6		
Coal, bituminous, good	0	2		
Cannel, good, but not curly	0	5	2	5
Coal, bituminous, good	1	10		
Brownish-gray sand rock, exposed, about	0	6		
	5	11		

The place of the bed appears also to be indicated by an exposure of about three inches of bituminous coal a little more than 40 feet in level below the opening on Wood's Upper Coal at Perfater's Spring already mentioned.

The quality of the Factory Cannel Bed is plainly very variable, and its thickness extremely so. The bed thins out towards the Kanawha, near Brownstown and above, and can scarcely be found there at all, having but a few inches of thickness and no cannel. It may prove workable in some spots, especially near the factory, but is so thin and variable that it can hardly be counted on. The cannel lasts so long, when exposed to the weather, that bits of it are found all along the outcrop, which is therefore comparatively easy to follow on the ground; and can be looked for between the outcrops of Wood's Upper and Wood's Lower Coal.

SHOOT COAL.—The Shoot Coal Bed, at Peytona, is so-called from the opening near the foot of the shoot at the mines. The opening was closed and no longer accessible in 1872, but was said to have had the following section from above downward:

	FT.	IN.
COAL, bituminous, good, hard	0	10
Slate	0	1½
COAL, bituminous, good, very hard, "breaks almost like anthracite"	2	6½
	3	6

The same bed is also said to have been opened a great many years ago, by Dr. DuBois, above the Blacksmith Bank, and found to have a thickness of over 4 feet, besides 3 inches of slate at 10 inches below the top.

The bed was opened in 1872, in Abshire's Hollow, opposite Abshire's house, with the following section from above downward:

	FT.	IN.
No solid roof.		
COAL, bituminous	2	10
COAL, "splint," or bony	0	6
	3	4

The bed was likewise opened in 1872, on Indian Creek, about 300 yards above Abshire house, and 50 yards below the mouth of Meadow's Fork of Indian Creek, and had the following section from above downward:

	FT.	IN.	FT.	IN.
Gray shales.				
Soft black slate.....about	0	1		
COAL, bituminous	0	9		
Slate	0	3½	3	7
COAL, bituminous	2	6½		
	3	8		

On Lens Creek, the coal bed of Wood's lower mine (a drift some 20 feet long), on King's Branch of the Left Fork, is the same as the Peytona Shoot Coal Bed, and has the following section from above downward:

	FT.	IN.	FT.	IN.
Solid sand rock exposed .....about	4	0		
COAL, bituminous	1	0		
Slate or clay.....about	0	0½		
COAL, bituminous	1	7	3	8
Slate or clay.....about	0	0½		
COAL, bituminous	1	0		
	7	8		

The same bed was opened in 1872, near the schoolhouse of the left fork of Lens Creek, and had the following section from above downward:

	FT.	IN.	FT.	IN.
Brownish-gray sand rock, exposed, about	2	6		
Coal, bituminous, firm and good.....	2	9		
Bony coal or slate.....	0	0½	4	0½
Coal, bituminous, firm and good.....	1	3		
Slate, exposed.....about	0	3		
	6	9½		

The coal seems to be of fine quality.

The same bed was formerly opened at Fry's Coal Bank, still partially accessible in 1872, and had the following section from above downward:

	FT.	IN.
"Slate roof of unknown thickness."		
Coal, bituminous, very firm, good.....	3	3
"Slate bottom."		

Near the mouth of the drift the coal has a quarter-inch of slate at a foot or fifteen inches from the bottom; but the slate is said to disappear further in.

The same bed was opened rather imperfectly on Stewart's Branch, nearly three-quarters of a mile southwest of the forks of Lens Creek and had the following section from above downward:

	FT.	IN.
Gray and black shales .....about	10	0
Gray sand with some particles of coal mixed.....	0	4
Coal, bituminous.....	2	0
Hard, brownish-gray sand rock.		
	12	4

The same bed, apparently, was opened in 1872, in Peels' Hollow, with the following section from above downward:

	FT.	IN.
Loam.		
Brown shales.....about	2	2
Coal, bituminous.....	0	6½
Fireclay.		
	2	8½

But, perhaps, the coal bed was not fully exposed; or possibly, by an error of the aneroid level, this may be the representative of the Blacksmith Coal Bed.

Imperfect openings of the same bed were also made nearly opposite Nuby's, on the Left Fork of Lens Creek, where only two feet are exposed

in a crush of loose rocks; and near Asa Ferrel's, on the Right Fork of Lens Creek, where less than a foot of crop coal has been uncovered.

This coal bed is clearly the same as the bed formerly worked at the Winifrede Coal Co.'s main mine, less than a mile east of the main Parker tract. That mine was still accessible in 1872, with a little difficulty, and near the mouth of the drift gave the following section from above downward:

	FT.	IN.	FT.	IN.
Brownish-gray, massive sand rock.about	5	0		
Slate	0	8		
Brownish-gray, massive sand rock	1	9		
Slate	3	0		
COAL, bituminous, firm and good	2	9		
Clay	0	3	4	6
COAL, bituminous, firm and good	1	6		
Shale, exposed.....about	1	0		
	15	11		

The quality of the coal, as well as the slate or clay parting, is extremely like what is found at the opening on Wood's Lower Bed (the Peytona Shoot Bed), near the schoolhouse of the Left Fork of Lens Creek, and at Fry's Coal Bank on Ketcham Branch and at other points. The identity was evidently recognized by Prof. Hall forty years ago.

The coal of Wood's Lower Bed on Lens Creek seems all to be of very fine quality, richer in gas than Wood's Upper Coal and somewhat less firm than that, though still very firm and capable of bearing handling very well. It is much liked as a domestic coal, and would probably be a good gas coal. It is unquestionably the same as the one of the Winifrede mines, the coal of which bears a very high reputation; and is probably the same in quality, since those mines are within a mile of the eastern edge of the main Parker tract. Besides, as already pointed out, the resemblance is very strong indeed.

The Winifrede Coal was supposed in 1872 to be also the same as the bed of the Coalburg mines, a couple of miles more distant up the Kanawha; but, in spite of the resemblance of the structure of the two beds and the quality of the coals and other arguments, Prof. White (Bulletin 65, p. 162), says that the Winifrede is seventy-five or one hundred feet lower than the Coalburg coal, reckoning from the Kanawha black flint. In that case it would seem that the Coalburg bed must be the same as Wood's Upper Coal, the Upper cannel of Peytona; but the distance apart in these two surveys is about one hundred and twenty feet, a difference hard to reconcile. The Shoot Bed of Peytona, Wood's Lower Bed of Lens Creek, seems hereabouts to be the most uniform in thickness and in quality of all the coals below the barren measures, and to be everywhere a very excellent, firm, bituminous coal and of workable thickness wherever it has been fully opened. Towards the Kanawha,

outside of the tracts, it appears to be in two or three benches separated by layers of clay a foot or even more in thickness.

BLACKSMITH COAL.—The Blacksmith Coal at Peytona is so named for its purity and usefulness in the forge, and would seem to be very persistently of fine quality, since the same bed is called so in the northern edge of the State. It is, however, probably too thin to work at present, except for local use along the outcrop.

It was worked by a drift at the lower part of the Peytona mines, and had there the following section from above downward :

		FT.	IN.	FT.	IN.
Brownish-gray sand rock	about	4	0		
Hidden	"	1	6		
Brownish-gray, hard shales, exposed	"	0	6		
Soft shales	"	0	2		
COAL, bituminous	"	0	2		
Bony coal or slate	"	0	1¼		
COAL, bituminous	"	0	9	2	3
Slate	"	0	0¼		
COAL, bituminous	"	1	2½		
Clay, apparently.					
		8	5		

The bed was opened also at Abshire's Coal Bank, on Indian Creek near Abshire's Hollow, with the following section from above downward :

		FT.	IN.
Shaly sand rock, exposed	about	5	0
COAL, bituminous, good		2	0
Fireclay, mixed with slate.			
		7	0

The same bed is opened, too, in Abshire's Hollow, back of his house, with the following section from above downward :

		FT.	IN.
Shales, exposed	about	3	0
Shaly sand rock	"	2	0
Slate	"	0	6
COAL, bituminous	"	2	1
Fireclay mixed with slate.			
		7	7

This bed at Lens Creek appears at about twenty feet below Wood's Lower Coal.

It would seem to be the bed opened in 1872 on Ketcham Branch, near the southeast corner of the map, in two places near together on opposite

sides of the branch and about half a mile from its mouth. At the upper, southern, one there was the following section from above downward:

		FT.	IN.
Gray shale, exposed	about	3	0
Black slate	"	1	6½
Gray shales	"	0	8½
COAL, bituminous, and clay and slate in several layers, mostly coal	"	1	2
Gray shales.		6	5

At the lower, northern, opening of the two, there was the following section from above downward:

		FT.	IN.	FT.	IN.
Brownish-gray sand rock	about	1	6		
Brown and gray shales	"	5	0		
Black slate	"	1	5		
Gray shales		1	0		
COAL, bituminous		0	3		
Clay		0	2	0	7
COAL, bituminous		0	2		
		9	6		

The same bed seems also to have been opened on the Stewart Branch of the Left Fork, some 500 yards above the mouth of the branch, by a couple of old ruined drifts that expose a few inches only of the top of the coal, with two or three feet of shales over it.

JERROLD'S COAL.—Jerrold's Coal of Lens Creek seems not to exist at Peytona, but to be represented perhaps by some three inches of black slate at the bottom of about twenty feet of apparently iron-bearing brown shales just like those that overlie the bed on Lens Creek. The black slate is exposed on the railroad about sixteen feet above the top of the lower shoot.

The bituminous coal bed worked by Jerrold on the bank of the Left Fork of Lens Creek, just below the mouth of Ketcham Branch, has the following section there, from above downward:

	FT.	IN.	FT.	IN.
Loose blocks of sandrock.				
Roof slate, exposed	1	0		
COAL, bituminous, comparatively soft	0	7		
COAL, bituminous, much of it hard "splint," but generally less hard than Wood's Upper Coal	2	8½	3	3½
	4	3½		

It would seem probable on the whole that it is the same bed that was worked at Mitchel's Coal drifts on the left fork of Lens Creek about 200 yards above the mouth of Ketcham's Branch; though it is possible that

the coal here is a local thickening of the small bed that occurs some fifteen feet below Jerrold's Coal. The section at Mitchel's drifts is as follows, from above downward:

	FT.	IN.
Slate, exposed.....about	1	6
COAL, bituminous, less firm than Wood's Upper Coal, but of fair quality.....	3	1
"Slate floor."		
	4	7

The same bed apparently was opened at the old drift on the Ketcham Branch of the Left Fork of Lens Creek, near the mouth of the branch. The coal is partly covered at the bottom; but would seem to measure about two feet in thickness.

The Jerrold Coal is seen also at Mrs. Nuby's coal mine, a drift about six feet long on the Left Fork of Lens Creek, 300 yards below her house, with the following section from above downward:

	FT.	IN.	FT.	IN.
Shales, exposed.....about	4	0		
COAL, bituminous, of fair quality.....	1	0		
Clay.....	0	0¼	2	10¾
COAL, bituminous, of fair quality.....	1	10½		
	6	10¾		

Two inches above the clay seam, there is, at least in places, another similar clay seam.

The same bed was worked with eight old drifts close together just across the creek, and had there the following section from above downward:

	FT.	IN.
Sand rock, massive.		
Slaty shales and shaly sand rock with small iron-ore nodules.....about	15	0
COAL, bituminous, with two or three quarter-inch seams of black clay at about nine inches below the top; apparently 3,, 0 or more in one drift, in another, measured.....	2	10
Slaty shales.....	10	0
	25	0

The same bed is worked with a drift a dozen yards long at Myer's Coal Bank, close by the oil factory already mentioned, and has the following section from above downward:

	FT.	IN.	FT.	IN.
Brownish-gray sand rock, massive, about	12	0		
Slate.....	0	6		
COAL, bituminous, good.....	0	9		
Black clay.....	0	0½	2	8½
COAL, bituminous, good.....	1	11		
	15	2½		

The same bed is also worked by Gus. Hoffman, on the Vinnie Lick Branch of the Right Fork of Lens Creek, and has there the following section from above downward :

	FT.	IN.
Coal, bituminous	0	6
Clay	0	0⅛
Coal, bituminous	3	0
	3	6⅛

The bed has been worked, too, by a drift on the opposite (west) side of the Right Fork of Lens Creek, back of Gus. Hoffman's house, and has there the following section from above downward :

	FT.	IN.
Brownish-gray shaly sand rock.....about	8	0
Shales with iron nodules	1	6
Coal, bituminous	2	1
	11	7

The bed was imperfectly opened on the Right Fork of Lens Creek, opposite the mouth of Orchard Hollow and a quarter of a mile above the mouth of Vinnie Lick Branch, and had the following section from above downward :

	FT.	IN.
Shaly sand rock with some nodules of impure iron ore.....about	6	0
Coal, bituminous, good, but much weathered, at least.....about	1	9½
Dark shales	5	0
	12	9½

Half a foot of the top of the coal bed is exposed under the shales near Mr. Hoffman's, opposite the mouth of Big Hollow, on the Right Fork of Lens Creek.

The bed was opened in 1872 in Locust Hollow near the east bank of the Right Fork of Lens Creek, and had the following section from above downward :

	FT.	IN.	FT.	IN.
Clay shales, no solid roof	2	0		
Coal, bituminous, mostly hard and good.	1	6½	3	0½
Clay	1	0		
Coal, bony	0	6		
	5	0½		

Another imperfect trial pit on the same bed, some twenty yards to the south, gave about the same measurements, but some of the lower bench seemed to be like cannel.

The same bed is at least partially exposed where it finally passes southward beneath the bottom of the valley of the Right Fork of Lens Creek, at the mouth of Rise Hollow. The coal there is partially concealed by muddy water and perhaps rubbish in the hole, but would seem to be only 1,, 6 or two feet thick, with only two feet of wash for a cover. The wash is stripped off, and the coal dug out. The coal is firm and in large lumps, bituminous, of good quality and much liked by the country people.

The coal at Jerrold's, Hoffman's, Nuby's and Myer's mines, and at Rise Hollow is of good quality, but not equal to Wood's Upper and Lower coals. It is less firm, especially the upper six inches, than either of them; but the greater part of the bed is far from being tender. The quality in fact seems to be on the whole pretty fair. The thickness would seem to be rather variable, and it may prove to be unworkable at present in some parts of the tracts. It not only disappears at Peytona, but on the Kanawha above Brownstown would seem to be hardly of workable thickness, or only two feet and a half, though worked a little at some points.

VICKER'S COAL.—Opposite the mouth of Vicker's Branch, on the Left Fork of Lens Creek, at the lower end of the eight drifts on the Jerrold Coal, there are two old drifts on a coal, a dozen or fifteen feet lower; and, for want of a more suitable name, it may be called Vicker's Coal. The coal is no longer exposed for measurement here; but seems to have been perhaps two feet thick.

The same bed was worked at an old drift about fifteen feet below Jerrold's old coal opening on the Left Fork of Lens Creek, two hundred and fifty yards below the mouth of Ketcham Branch. There also the drift has fallen in so as to be inaccessible and leave the coal unexposed. The thickness seemed to have been perhaps two feet.

The bed may probably be the same as the one exposed at Peytona, nine feet below the top of the waterfall below the lower shoot. It has there the following section from the top of the waterfall downward:

	FT.	IN.
Brownish-gray sand rock, very cross-bedded.....	9	0
COAL, bituminous.....	0	3
Brownish-gray sand rock (?)		
	9	3

It is probable that the coal bed was of greater thickness than that, at the drifts on Lens Creek, or it would not have been opened for working at all; but as it seems to have been little worked compared with the Jerrold Coal just above it, there is no probability that it was more than the two feet thick it seems to have been.

It is barely possible that the coal of Mitchel's old drifts on Lens Creek just above the mouth of Ketcham Branch may be the Vicker's bed; and it was so supposed probable in 1872; but in that case it would have

been only quite locally thicker there. It seems on the whole very much more likely that Mitchel's coal was the same as Jerrold's.

Comparison with the Northern West Virginia Section.

According to Prof. J. J. Stevenson (*Trans. Am. Phil. Soc.*, Vol. xv, pp. 17–31, 1872), the section of the carboniferous rocks of a portion of Monongalia and Marion counties, in the northern edge of West Virginia, near the southwest corner of Pennsylvania, is as follows, from above downward:

		Mean.			
	Ft.	Ft.	In.	Ft.	In.
Upper Coal Group—Monongahela River Series.					
1. Sandstone, "Waynesburg"	30–40	35	0	43	0
2. Shale	1–15	8	0		
3. Coal, "Waynesburg"	6–9	7	6		
4. Sandstone	15	15	0	194	6
5. Shale	8	8	0		
6. Limestone	5	5	0		
7. Shales and sandstone	20	20	0		
8. Limestone and shale	30	30	0		
9. Sandstone and shale	35	35	0		
10. Limestone	6	6	0		
11. Sandstone	15	15	0		
12. Limestone	7	7	0		
13. Sandstone	10	10	0		
14. Limestone	8	8	0		
15. Sandstone and shales	23	23	0		
16. Shale	1–25	12	6		
17. Coal, "Sewickley"	4½–6	5	3	5	3
18. Shale	5–8	6	6	44	6
19. Limestone	9	9	0		
20. Sandstone	4–10	7	0		
21. Limestone	22	22	0		
22. Coal, "Redstone"	4–5	4	6		
23. Fireclay	1	1	0	39	0
24. Limestone	12	12	0		
25. Shale	5–12	8	6		
26. Sandstone	0–35	17	6		
27. Coal, "Pittsburgh"	7–14	10	6	10	6
28. Fireclay	3	3	0		
Lower Barren Group—Barren Measures.				20	0
1. Shale with iron	14	14	0		
2. Limestone	2–4	3	0		
3. Coal	1½–2	1	9	1	9

		MEAN.			
	FT.	FT.	IN.	FT.	IN.
4. Shale	3	3	0		
5. Sandstone	25	25	0		
6. Shales	8	8	0		
7. Limestone	3	3	0		
8. Shale with iron	4½	4	6	86	6
9. Limestone	1½	1	6		
10. Shales and shaly limestone	22	22	0		
11. Limestone	1½	1	6		
12. Shale	18	18	0		
13. Coal	1¼–2	1	7½	1	7½
14. Sandstone	10–35	17	6	17	6
15. Coal	⅔–1¼	0	11½	0	11½
16. Limestone	8	8	0		
17. Shales, olive	10	10	0		
18. Limestone	3	3	0		
19. Shales, olive	12	12	0	91	0
20. Sandstone	40	40	0		
21. Conglomerate	0–6	3	0		
22. Sandstone	15	15	0		
23. Coal	3½–4	3	9	3	9
24. Shales, variegated, with some shaly sandstone	33½	33	6		
25. Sandstone	1–4	2	6		
26. Shale, calcareous and fossiliferous	2–4	3	0	63	0
27. Shale, variegated, fossiliferous	24	24	0		
28. Coal	½–1½	0	11	0	11
29. Limestone	5	5	0		
30. Shales, variegated, with iron	20	20	0		
31. Sandstone	10–20	15	0		
32. Shales with iron	10–15	12	6	139	6
LOWER GROUP—ALLEGHENY RIVER SERIES.					
1. Sandstone, "Mahoning"	75	75	0		
2. Shales	12	12	0		
3. Coal	1⅓	1	4	1	4
4. Shales	1–25	13	0	13	0
5. Coal	4–5	4	6	4	6
6. Shales	10	10	0	10	0
7. Coal	1	1	0	1	0
8. Sandstone	5	5	0		
9. Shale	10	10	0	49	6
10. Limestone, "ferriferous"	4–5	4	6		
11. Shale	30	30	0		

		MEAN.			
	FT.	FT.	IN.	FT.	IN.
12. Coal.....	3½	3	6	3	6
13. Sandstone and shale.....	20–30	25	0	25	0
14. Coal, "Blacksmith".....	2–3	2	6	2	6
15. Shale	15–20	17	6		
16. Sandstone, "Tionesta"...	25–30	27	6	70	0
17. Shale.....	25	25	0		
18. Coal	1¾	1	9	1	9
19. Sandstone.....	4	4	0	4	0
20. Coal.....	1	1	0	1	0
21. Shale	10	10	0	10	0
Great conglomerate, Penna. No. XII.....about	350			350	0

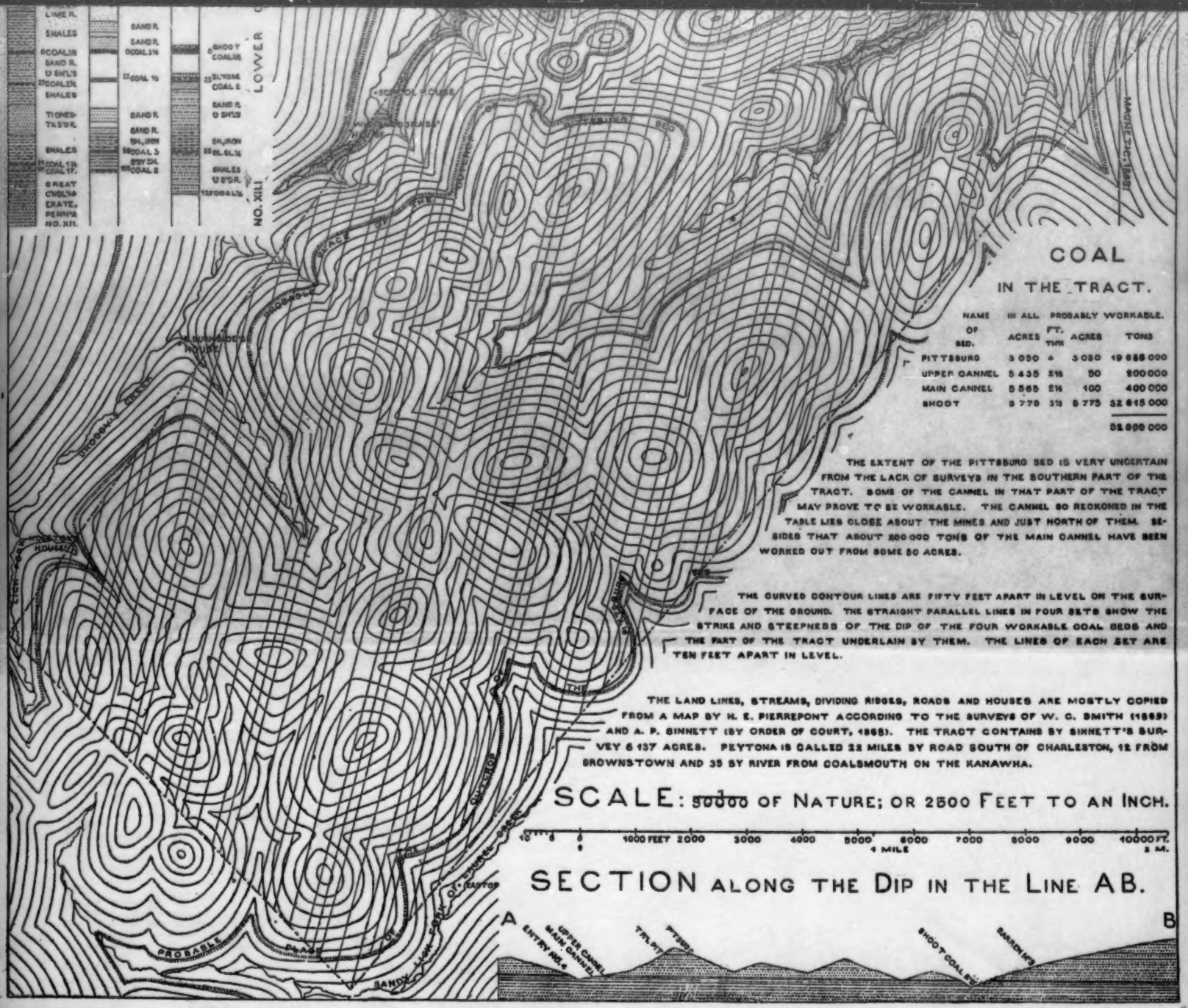
The following table of sections shows the coal beds and the intervals between them at Peytona, and in several parts of the Lens Creek field, as well as an average of the whole Lens Creek field, in comparison with the corresponding beds of Prof. Stevenson's section for the northern edge of the State, as just given.

The columnar sections drawn on the two maps show the correspondence of the coal beds still more clearly.

Identification of the Coal Beds.

Comparing these sections with the sections given by Prof. I. C. White in his Bulletin No. 65, it appears that the six-inch coal about twenty-three feet below the Pittsburgh Bed at Peytona is the little Pittsburgh Bed of Fayette county, Pa.; the Slate Vein would apparently correspond to the Little Clarksburg Coal, likewise slaty at Clarksburg, W. Va.; the three-inch bony coal about 200 feet below the Pittsburgh Bed at Peytona (or possibly the five-foot coal fifty-five feet lower) would correspond to the Elk Lick Coal of the Pittsburgh, Allegheny County and Fayette County region; the six-inch bituminous coal at nearly twenty feet above the Upper Cannel or Wood's Upper Coal, would be the Upper Freeport Bed; the Main Cannel, or Factory Cannel, would be the Middle Freeport Bed; Stevenson's coal bed No. 7 would be the Lower Freeport Bed; the Shoot Coal, or Wood's Lower Coal, or the Winifrede Coal, would be the Middle Kittanning Bed; the Blacksmith Coal would be the Lower Kittanning; Jerrold's Coal would be the Clarion Bed; and Vicker's Coal would be the Brookville Bed.

The leveling of the surveys was done partly with the vertical circle of a transit, partly with a hand level and partly with an aneroid; and though not perfectly exact, was no doubt quite sufficiently so to confirm the identification of the coal beds and to prove that the general sections of the surveys agree very strikingly with the one of northern West Virginia.



COAL IN THE TRACT.

NAME OF SED.	IN ALL. ACRES	PROBABLY WORKABLE. FT. THN	ACRES	TONS
PITTSBURG	3 050	4	3 050	19 685 000
UPPER CANNEL	5 435	2½	50	200 000
MAIN CANNEL	5 565	2½	100	400 000
SHOOT	3 770	3½	3 775	32 615 000
				52 900 000

THE EXTENT OF THE PITTSBURG SED IS VERY UNCERTAIN FROM THE LACK OF SURVEYS IN THE SOUTHERN PART OF THE TRACT. SOME OF THE CANNEL IN THAT PART OF THE TRACT MAY PROVE TO BE WORKABLE. THE CANNEL SO RECKONED IN THE TABLE LIES CLOSE ABOUT THE MINES AND JUST NORTH OF THEM. BESIDES THAT ABOUT 200 000 TONS OF THE MAIN CANNEL HAVE BEEN WORKED OUT FROM SOME 50 ACRES.

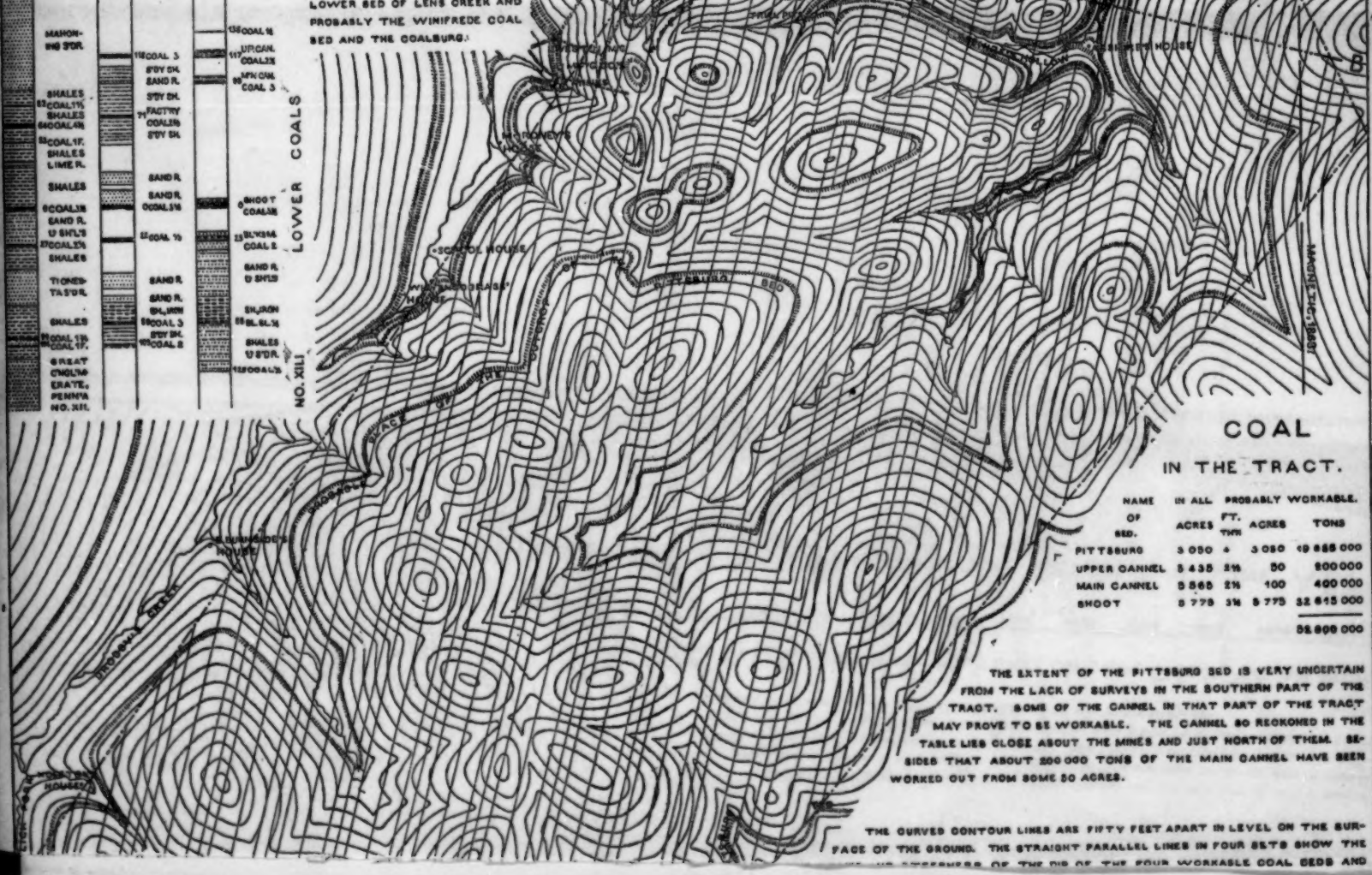
THE CURVED CONTOUR LINES ARE FIFTY FEET APART IN LEVEL ON THE SURFACE OF THE GROUND. THE STRAIGHT PARALLEL LINES IN FOUR SETS SHOW THE STRIKE AND STEEPNESS OF THE DIP OF THE FOUR WORKABLE COAL SEDS AND THE PART OF THE TRACT UNDERLAIN BY THEM. THE LINES OF EACH SET ARE TEN FEET APART IN LEVEL.

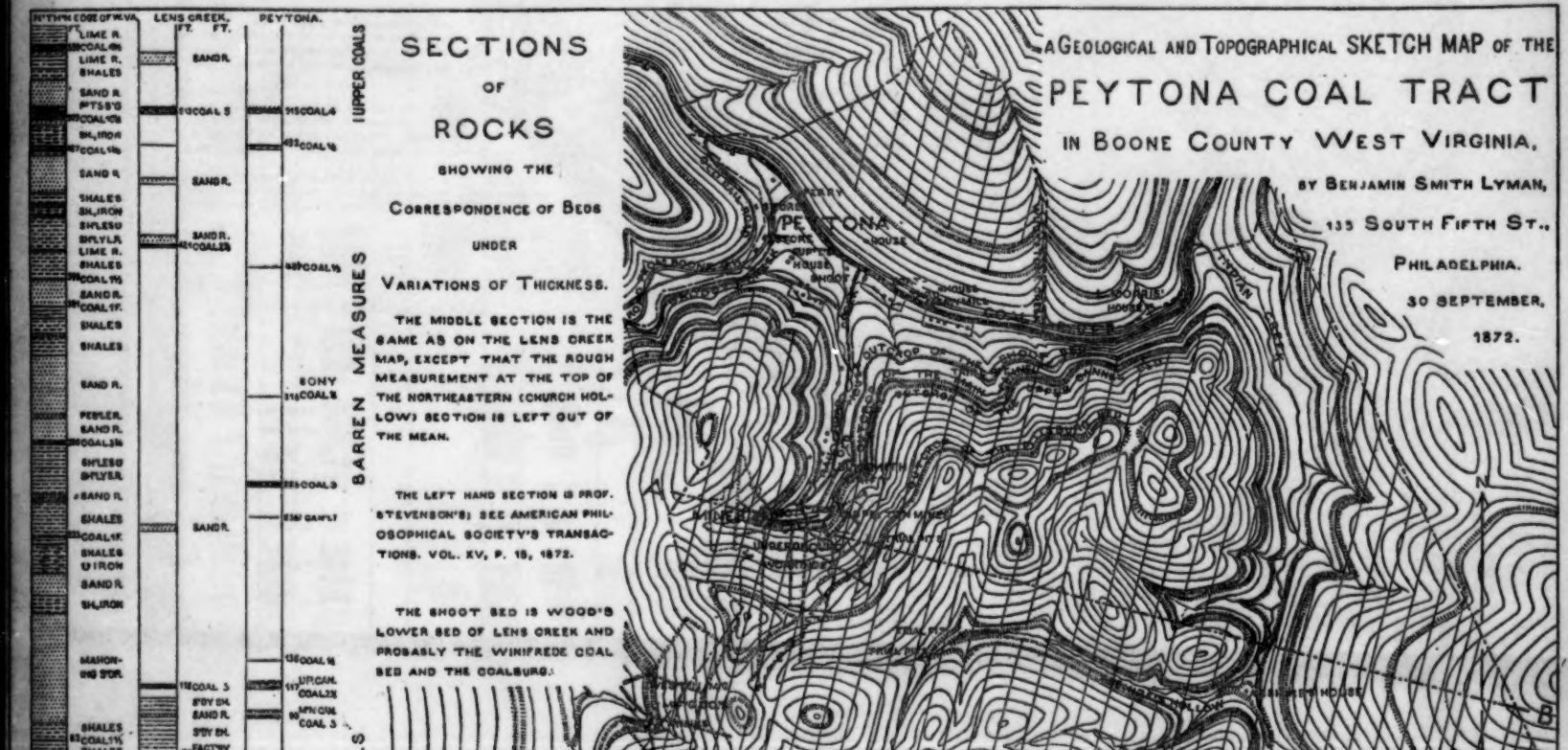
THE LAND LINES, STREAMS, DIVIDING RIDGES, ROADS AND HOUSES ARE MOSTLY COPIED FROM A MAP BY H. E. PIERREPONT ACCORDING TO THE SURVEYS OF W. C. SMITH (1869) AND A. P. SINNETT (BY ORDER OF COURT, 1868). THE TRACT CONTAINS BY SINNETT'S SURVEY 6 137 ACRES. PEYTONA IS CALLED 22 MILES BY ROAD SOUTH OF CHARLESTON, 12 FROM BROWNSTOWN AND 35 BY RIVER FROM COALSMOUTH ON THE KANAWHA.

SCALE: ~~50000~~ OF NATURE; OR 2500 FEET TO AN INCH.

10 5 0 1000 FEET 2000 3000 4000 5000 6000 7000 8000 9000 10000 FT.
1 MILE 2 M.

SECTION ALONG THE DIP IN THE LINE AB.


LOWER COALS
NO. XIII
LOWER BED OF LENS CREEK AND PROBABLY THE WINIFREDE COAL BED AND THE COALBURG.
SCHOOL HOUSE
SCHOOL HOUSE
MAGNETIC MERIDIAN
TRACT
PROSPECT
PROSPECT
PROSPEC



SECTIONS OF ROCKS

SHOWING THE CORRESPONDENCE OF BEDS UNDER VARIATIONS OF THICKNESS.

THE MIDDLE SECTION IS THE SAME AS ON THE LENS CREEK MAP, EXCEPT THAT THE ROUGH MEASUREMENT AT THE TOP OF THE NORTHEASTERN (CHURCH HOLLOW) SECTION IS LEFT OUT OF THE MEAN.

THE LEFT HAND SECTION IS PROF. STEVENSON'S; SEE AMERICAN PHILOSOPHICAL SOCIETY'S TRANSACTIONS. VOL. XV, P. 19, 1872.

THE SHOOT BED IS WOOD'S LOWER BED OF LENS CREEK AND PROBABLY THE WINIFREDE COAL BED AND THE COALBURG.

A GEOLOGICAL AND TOPOGRAPHICAL SKETCH MAP OF THE PEYTONA COAL TRACT IN BOONE COUNTY WEST VIRGINIA.

BY BENJAMIN SMITH LYMAN,
135 SOUTH FIFTH ST.,
PHILADELPHIA.

30 SEPTEMBER, 1872.

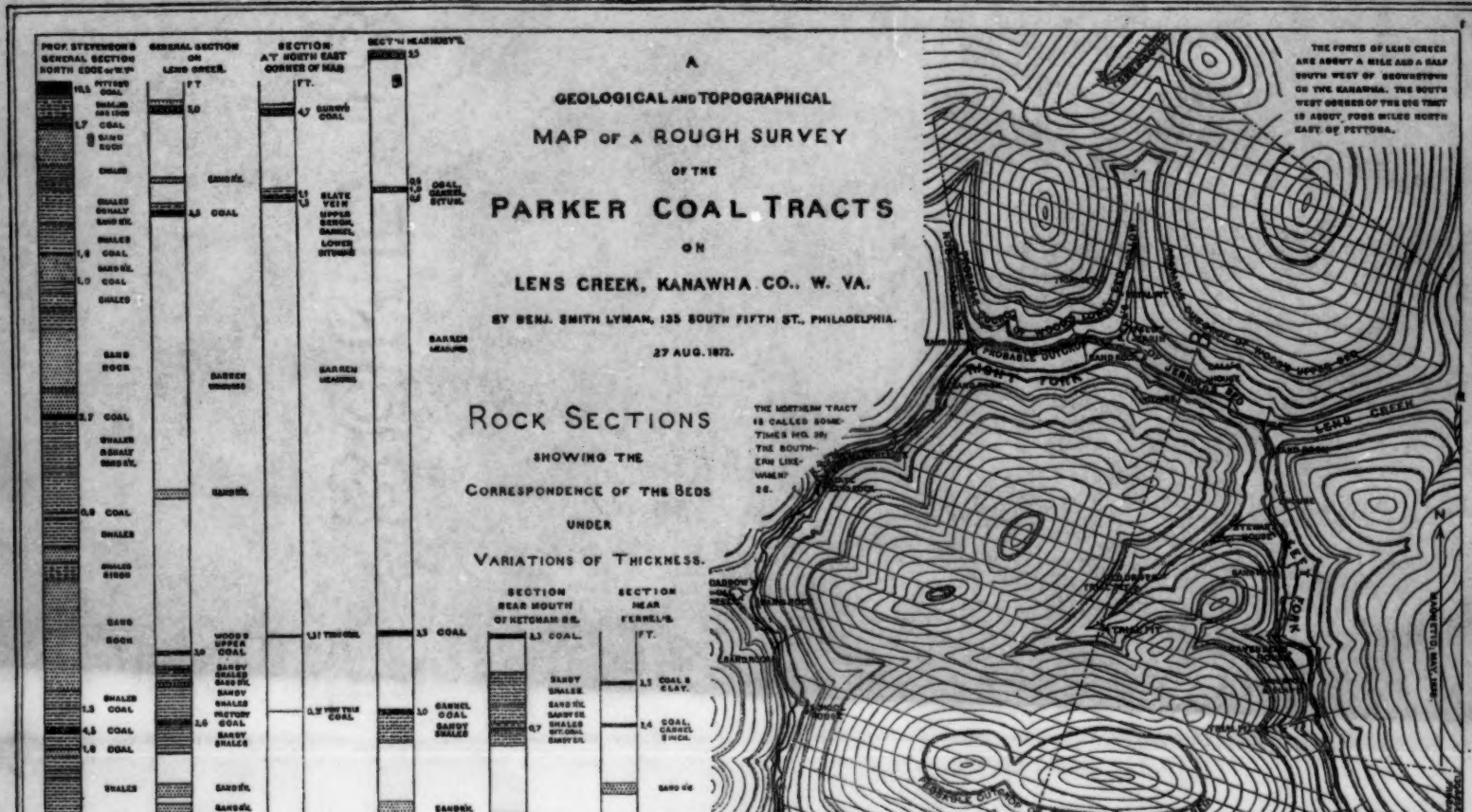
PEYTONA
SCALE
OUTCROP OF THE
UNDERCLIFF
HOUSE
SHOOT
SPRING
HOUSE
CHURCH
HOLLOW
HOUSE
HOUSE
HOUSE

SECTION ALONG THE DIP IN THE LINE A B.

SCALE: 1000 OF NATURE: OR 2800 FEET TO AN INCH.

WORKABLE COAL IN THE TRACTS.
NAME OF BED
FEET THICK.
6TH OF LESS CR ACRES.
6TH OF LESS CR TONS.
5TH OF LESS CR. ACRES.
5TH OF LESS CR. TONS.
IN ALL. ACRES
IN ALL. TONS
PITTSBURG 6 50 240.000 500 4,798.000 550 5,038.000
WOODS UPPER 2 373 1,015,000 4,470 21,835,000 4,845 22,850,000
WOODS LOWER 3½ 450 2,040,000 5,345 31,440,000 5,795 34,480,000
JERROLD'S 4 530 2,560,000 6,755 27,610,000 6,285 30,170,000
7,460,000 85,648,000 93,108,000
WOODS UPPER COAL AND JERROLD'S MAY BE TOO THIN TO WORK IN PLACES, AND SO BRING THE LAST TOTAL DOWN TO 75,000,000 TONS. THE FACTORY COAL IS PERHAPS WORKABLE IN SOME PLACES.
A PIECE OF WOODS UPPER COAL YIELDED: COKE 62.25%, GAS 33.25%, ASHES (DRY) 0.45%, HYGROSCOPIC WATER 1.95%. WOODS LOWER COAL IS OF FINE QUALITY. JERROLD'S COAL IS PRETTY GOOD. THE PITTSBURG COAL IS BADLY OPENED HERE AND ITS QUALITY NOT WELL KNOWN, BUT SEEMS FAIR.
WOOD'S UPPER COAL IS THE SAME AS THE PEYTONA UPPER CANNEL, THOUGH DIFFERENT IN QUALITY. THE FACTORY CANNEL COAL BED IS THE SAME AS THE PEYTONA MAIN CANNEL. WOODS LOWER COAL IS PROBABLY THE SAME AS THE WINIFREDE COAL BED AND THE COALBURG.
THE BOUNDARIES OF THE TRACTS ARE LAID DOWN PARTLY BY THE DEEDS, BUT WHERE THEY ARE THE DIVIDING RIDGE BETWEEN STREAMS THEY ARE COPIED FROM THE PRINTED MAP OF THE ST. GEORGES COMPANY AND ARE NOT EXACT.
THE TRACT NORTH OF LEWIS CREEK CONTAINS BY THE DEED 650 ACRES, BUT MEASURES AS DRAWN 676 ACRES. THE OTHER TRACT IS SOUTH OF THE CREEK AND CONTAINS BY THE DEED 3160 ACRES, BUT MEASURED AS DRAWN 3665 ACRES. OF THIS 487 ACRES HAVE BEEN SOLD IN TWO LOTS NEAR THE OIL FACTORY.
THE SURVEYING WAS DONE CHIEFLY ON THE ROADS LAID DOWN AND IN THE HOLLOWS WHERE COAL HAS BEEN OPENED. MOST OF THE REST IS MERELY SKETCHED.
THE KANAWHA SALT-BEARING BEDS LIE ABOUT 700 FT. BELOW THE COALS.
PROF. STEVENSON'S SECTION IS DESCRIBED IN HIS PAPER IN THE AMERICAN PHILOSOPHICAL SOCIETY'S TRANSACTIONS VOL. XV. P. 13. 1876.
SCALE: 1/30000 OF NATURE; OR 2500 FEET TO AN INCH.
0 500 FT. 1000 FT. 2000 FT. 3000 FT. 4000 FT. 5000 FT. 1 MILE 6000 FT. 7000 FT. 8000 FT. 9000 FT. 10000 FT. 2 M.
SECTION ALONG THE DIP IN THE LINE AB.
A
B
THE CURVED CONTOUR LINES ARE FIFTY FEET APART IN LEVEL ON THE SURFACE OF THE GROUND.
THE STRAIGHT PARALLEL LINES IN FOUR SETS SHOW THE STRIKE AND STEEPNESS OF DIP OF THE FOUR WORKABLE COAL BEDS AND THE PORTION OF THE TRACTS UNDERLAIN BY THEM. THE LINES OF EACH SET ARE TEN FEET APART IN LEVEL.

SURFACE OUTCROP OF THE PITTSBURG COAL BED
SURFACE OUTCROP OF WOODS UPPER COAL BED
SURFACE OUTCROP OF WOODS LOWER COAL BED
SURFACE OUTCROP OF JERROLD'S COAL BED
KINDS HOLLOW
BIG MUDDY RIVER
BIG MUDDY RIVER BRANCH
BIG MUDDY RIVER BRANCH
BIG MUDDY RIVER BRANCH


A
GEOLOGICAL AND TOPOGRAPHICAL
MAP OF A ROUGH SURVEY
OF THE
PARKER COAL TRACTS
ON
LENS CREEK, KANAWHA CO., W. VA.
BY BENJ. SMITH LYMAN, 135 SOUTH FIFTH ST., PHILADELPHIA.
27 AUG. 1872.
ROCK SECTIONS
SHOWING THE
CORRESPONDENCE OF THE BEDS
UNDER
VARIATIONS OF THICKNESS.
PROF. STEVENSON'S GENERAL SECTION NORTH EDGE OF W.VA.
GENERAL SECTION ON LENS CREEK.
SECTION AT NORTH EAST CORNER OF MAP
SECTION NEARNEY'S.
SECTION NEAR MOUTH OF KETCHAM BR.
SECTION NEAR FERRELL'S.
THE FORKS OF LENS CREEK ARE ABOUT A MILE AND A HALF SOUTH WEST OF SCOWDSTOWN ON THE KANAWHA. THE SOUTH WEST CORNER OF THE BIG TRACT IS ABOUT FOUR MILES NORTH EAST OF PETTORA.
THE NORTHERN TRACT IS CALLED SOMETIMES NO. 28; THE SOUTHERN LIKEWISE 26.
LENS CREEK
RIGHT FORK
LEFT FORK
PROBABLE OUTCROP

SECTION ALONG THE DIP IN THE LINE AB.
A
B
SCALE: 1/63 OF NATURE: OR 2500 FEET TO AN INCH.

	STEVENSON, N. EDGE, W. VA.		PEYTONA, GENERAL.		LENS CR., GENERAL.		NEAR FERREL'S R. F., LENS CR.		NEAR MOUTH OF KETCHAM BR.		NEAR NUBY'S L. F., LENS CR.		N. E. COR. MAP & CHURCH HOL.	
	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
Coal bed, "Pittsburgh"	10	6	4	0	5	0					5	6	4	9
Interval	20	0	23	0										
Coal bed	1	9	0	6	89	0					89	0	57	0
Interval	86	6	85	0										
Coal bed, "Slate Vein"	1	7½	0	4	3	0					3	3	3	0
Interval	109	5½	90	0										
Coal bed, "No. 23"	3	9	0	3										
Interval			55	0										
Coal bed			5	0	300	0					303	0	300	0
Interval	203	5	120	0										
Coal			0	6										
Interval bed			16	4										
Coal, "Upper Cannel"	1	4	2	6	3	0	2	6	3	4	3	6	1	3
Interval	12	6	18	3	44	0	26	9	61	0	47	0	50	0
Coal bed, "Main Cannel"	4	6	2	10	3	0	2	6	0	9	3	0	0	6?
Interval	10	0												
Coal bed, "No. 7"	1	0	92	6	67	0	68	0	63	0	66	0		
Interval	49	6												
Coal bed, "Shoot Bed"	3	6	3	6	3	8	0	6	4	0	2	0+		
Interval	25	0	23	0	22	0					23	0		
Coal bed, "Blacksmith"	2	6	2	0	0	4	78	0	93	4	0	3		
Interval	70	0	63	0	64	0					66	0		
Coal, "Jerrold's"	1	9	(slate)		3	0	2	0?	3	4	3	0		
Interval	4	0	37	0	14	0			14	0	14	0		
Coal, "Vicker's"	1	0	0	3	2	0?			2	0?	2	0?		
	623	7	644	9	602	0	180	3	244	9	630	6	416	6

The Ethics of Solomon.

By J. Cheston Morris, M.D.

(*Read before the American Philosophical Society, October 5, 1894.*)

Probably at no period of human history, unless it be in our own time and case, do we read of such changes as came over the Hebrew nation in the course of the century covering the reigns of Saul, David and Solomon.

For three or four centuries preceding, the land of Palestine had been occupied by the twelve tribes who took possession of it under the leadership of Joshua, the successor in command of Moses the great lawgiver. Trained in Egyptian knowledge and civilization, we should naturally look for marks of the impress of Egyptian modes of thought and expression in their writings; and accordingly we do find much that is to be explained by their contact with, and departure from, this phase of human development as illustrated by the monuments and mummies which have been and are now so carefully studied. A pastoral and agricultural people, living in detached communities, associated more or less closely by consanguinity and common dangers, and with a worship which separated them from the idolatrous nations surrounding them, they seem to have enjoyed varying degrees of prosperity and freedom under the judges or rulers who arose among them from time to time. The ancient empire of the Hittites had crumbled and disappeared; the rival Assyrian and Egyptian empires had alternately prospered and waned, and were then, as they continued to be, in frequent contact and struggle for supremacy. Along the east coast of the Mediterranean were powerful cities of Philistines and the commerce-loving Tyrians and Sidonians. As in after ages, the rich and fertile plains, the valleys and mountain fastnesses of the land of Canaan, Gilead, Bashan and Moab produced food and cattle in enormous quantities for the supply of these neighboring nations, and caravan routes were well established along the coast and across the Arabian and Syrian deserts. By these communication was made and exchange effected between the products of the valleys of the Nile and the Euphrates; while by the commerce of Tyre, the Iberian peninsula and possibly the shores of Albion were brought into intercourse with far Cathay, as we may infer from the length attributed to the voyages of the navies of Hiram and Solomon and the cargoes with which they were freighted. But with the movements or interests of their neighbors the Hebrews hitherto had had little concern—they might hardly even have had more title to be considered as a nation than have to-day the wandering Bedouin bands that are the sole permanent inhabitants of Arabia. Their territory was raided by Moabite, Amalekite or Philistine: no advance in arts or sciences took place among them; and even their monotheistic faith seemed likely to die out, as it degenerated into a superstitious reverence for the Ark, or was overlaid with the idolatry of the surrounding peoples. After the capture of their great Palladium

by the Philistines, they became the slaves of the latter, until, under the guidance of Samuel, Saul raised the standard of revolt, blew the trumpet in Gibeah with the shout, "Let the Hebrews hear." Successful in driving off the oppressing bands of the Ammonites, he was soon surrounded by large numbers of his countrymen now roused to strike for their liberty; he organized them and led them to victory. But the crowning achievement of the war with the Philistines which ensued was not his, but that of "a youth, ruddy and of fair countenance," who with sling and stone slew in mortal combat the challenging giant of the Philistine army, and thus became, in accordance with Saul's offer, his son-in-law. The kingdom of the Hebrews was then successfully established, and by the prowess of its warriors gained respectful consideration among its neighbors. The subsequent madness of Saul, his jealousy and banishment of David, and his death in his last great battle with the Philistines, we need not stop to consider, except to note the indignation which Nabal's sneer, "There be many *slaves* nowadays who have run away from their masters," aroused in David, as an index of how the movement of the Hebrews was regarded by the wealthy sheep-master of Carmel. The death of Saul was in a few years followed by David's public recognition as king of the united nation—by the capture of Jerusalem from the Jebusites and its establishment as his capital, whence he waged war after war against the surrounding Moabites, Edomites and Ammonites, extending his territories, carrying off immense booty, and levying heavy imposts on his subjugated enemies. Of all this we read only incidental and fragmentary allusions, yet sufficient to enable us to trace the rise of the nation to power and wealth; so that we are not surprised at the alliance of Pharaoh's daughter with his son Solomon. If David's character as that not only of the sweet singer of Israel, but a large-hearted, earnest man and devoted servant of God, should interest us, not the less should that of his son and successor. Born and reared amid all these commotions and developments, and doubtless trained carefully by Nathan and the other counsellors of his father, and impressed with the duty laid upon him to consolidate and strengthen the new kingdom, he evinces a spirit of wisdom and discretion, an earnest study of the conditions of his life work that may well win our admiration. The building of the temple and the palace for which preparations had been made during his boyhood would naturally draw to Jerusalem the best skill and thought of the time; for it was well known that neither means nor desire were wanting to make them what indeed they were, worthy of rank among the wonders of the world. Then also the overland commerce between Egypt and Assyria traversing such an extent of Solomon's dominions, and fostered by him by building fortresses and outposts to protect the caravans as they came from Damascus to the shores of the Mediterranean, would bring such an amount of business to Jerusalem that we can readily understand how he made silver and gold as common as iron and stone in his rapidly growing capital. Judicious alliances and treaties, his reputation for justice and fairness, and the prosperity of the

nation, naturally attracted men of science and thought around him, just as in later days they were to be found at the court of Haroun al Raschid. Then the public works, undertaken and carried out so magnificently with the aid of skilled men from Tyre, for instance, would have brought together the architects and mechanicians, the sculptors and brassfounders, and many other artisans whose occupations and achievements must have seemed most marvelous to the nation of shepherds and herdsmen. We read in the sacred history of the brassfoundings and castings made by some of these men, and can readily comprehend after clouds of smoke from the furnaces had filled the valley and plain of the Jordan, and forms of beauty and grace came from the moulds prepared by these foreigners, how tales of genii and afreets spread among the people, and Solomon's ring became invested with the magical powers which it possessed in the imaginations of the East. We can see the genesis of stories like that of Aladdin. But amid all this concourse of men of thought and action the guiding spirit is that of Solomon. Of studious, reflective, observant and judicial turn of mind, we find recorded among his works not only proverbs and poems, but treatises on natural history. We are informed that he "spake of trees from the hyssop to the cedar of Lebanon," *i. e.*, from mosses to conifers, "and of beasts and fowl, creeping things and fishes." Though these treatises are lost, we may judge of his accuracy from such allusions as are made in Proverbs and Solomon's Song to the habits and actions of both animals and men.

We may then easily picture to ourselves this powerful king gathering around him a sort of Academy of Sciences, or Royal Philosophical Society, before which would come many and varied subjects of interested discussion among representative men of the differing civilizations of the period. Before such an "Assembly" or *εκκλησια*, or acting perhaps as its Secretary or Reporter or Clerk, *εκκλησιαστης*, we may imagine him reading a paper on the theme of man: his object and destiny in the universe, and how he can attain to his best development, his highest good. We may suppose Egyptian Materialism, Assyrian Fatalism, and Tyrian Commercialism or Opportunism well represented in the audience, either taking part in the discussion or having their respective views stated, to be criticised and shown to be partly erroneous or insufficient, and followed by the statement of his own solution, and the application of it to the whole problem. This is to be found in Ch. viii. 1: "Wisdom maketh a man's face to shine." If we look to Solomon's conception and impersonification of Wisdom as given in Proverbs viii and ix, and think of the contrast he draws between it and "the false woman" as Socrates ages after did between the true and false reason, and recall the devotion of the Alexandrian school to the Holy Wisdom which led to the opening words of John's Gospel in which the same wisdom is called The Word—*Λογος*—the Son of God, and afterwards to the erection of "Hagia Sophia" at Constantinople, we shall, it seems to me, gain the clue so much sought after to this Book of Ecclesiastes. It then all comes into logical form as a grand discussion on the theme of what

is profitable for man, and what should be the ruling aim of his life; and the conclusion is given in the last verses.

The propositions which Solomon maintains are:

The omnipotence of God:

The future life of man: and

The judgment after death.

The whole is cast into the form of a poem, as may easily be seen by putting the verses of the Authorized Version in parallelism, or by following the Septuagint translation, in which I find this already done. I have also tried to analyze the differing arguments and sentiments, and to attribute them respectively to an Egyptian, an Assyrian, and a Tyrian speaker, and to Solomon in reply, concluding with the verdict of the Assembly as given by its "Shepherd" or presiding officer.

As to the success of such an effort and how far it explains the whole book, I leave to the candid reader and critic to determine. The "materialistic" views of esoteric Egyptian philosophy, the successive passage of earth, air, fire and water into each other, the perpetual round of the forces of Nature, are first given; then the dark "fatalism" of the East, "to everything there is a season;" then selfish "opportunism," are successively discussed, and dismissed as insufficient or unworthy explanations of this "sore travail of the sons of men." Then comes the solution, to walk in the fear of God, in the wisdom of God, in the hope of a life beyond, followed by the beautiful peroration, and summing up of the whole.

The composition of the book is easily explained by the circumstances given, and its argument is complete, without any necessity for supposing later Epicurean or Stoic or Platonic influences. The problems of human existence had been thought out far beyond these in the East long before, as we find from Pythagoras, and the monumental evidences we are discovering in the present era of investigation among the remains of antiquity.

Brugsch Bey, in 1876, drew for me a schema which represented what he considered the esoteric Egyptian philosophy: four altars in profile, dedicated to earth, fire, air and water respectively, while a circle above indicated the perpetual change of matter from one of these forms into another. Each is worshiped as divine, and each has both a male and a female name. From this I took my concept of the views of the Egyptian. Omar Kayam's celebrated "Rubayat" furnished me with that of the Assyrian, while the Chinese commissioner, Hon. Fung Kwang Yu, in his statement before the Parliament of Religions, at Chicago, of the doctrines and modes of worship of the followers of Confucius almost exactly echoes the sentiments of my Tyrian.

Since writing the above I have availed myself of the kind criticisms and suggestions as to several passages of my friends: Rt. Rev. O. W. Whitaker, Dean Bartlett, Dr. McVickar, Prof. Morris Jastrow, Jr., Dr. W. F. Brand and Dr. Benjamin Lee; to whom, as well as to Rev. Mr. Elwyn and Rev. Dr. Cattell, I hereby return my thanks and acknowledgments. While

Jerome, Luther, Desvoeux and Herder have each suggested some such colloquy as I have proposed, their exact views were unknown to me until this article was in print; and I would submit that Herder's very similar division in many instances is an argument in favor of the hypothesis.

ECCLESIASTES.

1 The words of the Ecclesiast the son of David (the) king of Israel in Jerusalem.*

SOLOMON.

2 Perplexity of perplexities, said the Ecclesiast, all is perplexity.†
3 What profit to the man in all his labor
In which he labors under the sun?

EGYPTIAN.

4 A generation goes, and a generation comes,
And the earth has stood for ever.
5 The sun rises and the sun sets:
And hastes to its place (again).
6 It rising there moves toward the South:
And circles (again) toward the North.
The wind goes in a circling of circles:
And returns upon its circles.
7 All the streams run into the sea,
And the sea is not filled:
To the place where the streams run,
Thither they return to flow.
8 All words are feeble:
A man shall not be able to speak it:
And the eye shall not be filled with seeing:
And the ear shall not be satisfied with hearing.
9 What has been? that is what shall be:
And what has been done? that shall be done.
And there is no new thing under the sun.
10 Who shall speak and say, Behold this is new
It hath already happened in the ages before us.
11 There is no remembrance of the first things,
And to the latest things there shall be no remembrance
Among those that shall be born at the last.

SOLOMON.

12 I the Ecclesiast became King
Over Israel in Jerusalem:

*Translated from the Septuagint.
†See Liddell & Scott for true rendering of *ματαιοτης*.

13 And I gave my heart to seek out
And to observe in wisdom
Concerning all things happening under heaven:
For a difficult task God has given to the sons of men,
That they should be exercised in it.
14 I saw all the deeds done under the sun:
And behold all is perplexity and grasping of wind.
15 The scattered cannot be arranged in order,
And that which is lacking cannot be numbered.
16 I spoke in my heart to say:
Behold I am increased, and have added wisdom
Above all who were before me in Jerusalem.
And I gave my heart to know wisdom and knowledge:
17 And my heart considered many things,
Wisdom and knowledge, parables and understanding.
I knew that even this is a grasping of wind;
18 For in abundance of *wisdom* is an abundance of knowledge·
And the one adding knowledge adds pain.
2 I said in my heart, Come, I will prove thee in pleasure,
And see into the good: and lo even this too is perplexity.
2 I said to laughter, It is excess;
And to pleasure, Why doest thou this?
3 And I observed whether my heart would heat my flesh as wine:
And my heart walked in wisdom
And to seize upon pleasure;
That I might see what is good for the sons of men,
What they should do under the sun
All the days of their life.
4 I increased my working:
I builded me houses: I planted me vineyards:
5 I made for myself gardens and parks
And I planted in them every tree of fruit.
6 I made for me fountains of waters
To water thence the forest producing the trees.
7 I bought me men slaves and women slaves,
And house servants were born to me:
And even the possession of herd and flock was great,
Beyond all that had been before me in Jerusalem.
8 I gathered me even silver and gold,
And the treasures of Kings and of the countries.
I made for myself songsters and songstresses,
And luxuries of sons of men, cupbearer and female cupbearers.
9 And I was increased, and added
Beyond all who were before me in Jerusalem:
And indeed my wisdom remained with me.
10 And all which my eyes desired I withheld not from them:

I refused not my heart any pleasure,
Because my heart rejoiced in all my labor:
And this was my portion from all my labor.
11 And I beheld all the works which my hands had wrought,
And on the labor I had labored to do,
And behold all was perplexity, and grasping of wind
And there is no profit under the sun.
12 And I looked to consider wisdom,
And excess and folly:
For what man shall follow (*i. e.*, excel) after this plan?
Such he (the King) hath done (already).
13 And I saw that wisdom excels folly
As light excels darkness.
14 The eyes of the wise are in his head:
And the fool walks in darkness:
And I know, even I,
That one end shall meet them all.
15 And I said in my heart,
As the ending of the fool
Shall there be an ending even to me:
And wherefore was I wise?
I spoke moreover in my heart
That even this is perplexity,
Because the fool speaks from excess,
16 That there is no memory of the wise
Any more than of the fool through Eternity,
Because in the coming days all shall be forgotten.
And how dies the wise man as the fool?
17 And I hated life:
For it was evil to me,
The work done under the sun:
For all is perplexity, and grasping of wind.
18 And I hated all my labor
In which I labor under the sun.
19 For I shall leave it to the man who comes after me:
And who knows whether he shall be wise or a fool?
And whether he shall have authority in all my labor
In which I have labored and been wise under the sun?
This indeed is perplexity.
20 Then I turned to detach my heart
From all my labor which I had labored under the sun.
21 For there is a man, whose labor is in wisdom
And in knowledge and in manliness:
And the man shall give his portion to one who did not labor in it!
This is indeed perplexity and great injustice,
That it happens thus to the man
In all his labor and the grasping of his heart.

22 What shall be to the man in all his labor
And in the grasping of his heart
In which he labors under the sun?
23 For all his days are a struggling
Of pains and of his rage,
And even in the night his heart sleeps not—
This indeed is perplexity.

EGYPTIAN.

24 There is no good for man (except)
What he eats and what he drinks,
And what good he shows his soul in his labor.

SOLOMON.

Even this I see is from the hand of God.
25 For who eats and drinks without Him?
26 For to the good man before His Presence
He gives wisdom, knowledge and happiness:
And to the wicked He has given a struggle to add and to gather,
That He may give to the good man before the presence of God:
So that even this also is perplexity and grasping of wind.

ASSYRIAN.

3 Time is for all things:
And a season to every deed under heaven.
2 A season to be born, and a season to die:
A season to plant, and a season to pluck up the planted:
3 A season to kill, and a season to heal:
A season to destroy, and a season to build;
4 A season to weep, and a season to laugh:
A season to mourn, and a season to dance:
5 A season to throw away stones, and a season to gather stones:
A season to embrace, and a season to be far from embracing:
6 A season to seek, and a season to lose:
A season to keep, and a season to throw away:
7 A season to rend, and a season to sew:
A season to be silent, and a season to speak:
8 A season to love, and a season to hate:
A season of war, and a season of peace.

SOLOMON.

9 What profit to the worker in the things which he works?
10 I beheld all the struggle
Which God has given to the sons of men,
That they should struggle in it.

ASSYRIAN.

11 Everything which He has made is beautiful in its season ;
He hath even set all the eternity in their heart,
That man should not find out the doing which God does
From the beginning even unto the end.
12 I know that there is no good thing among them,
But to rejoice and do good in his life.
13 And indeed every man who eats and drinks
And sees good in all his labor,
This is the gift of God.

SOLOMON.

14 I know that all things which God hath made
These things shall be forever.
To Him it is impossible to add,
And from Him impossible to take away.
And God has made it
That men should fear before His Presence.
15 What has been already, is,
What shall be has happened already,
And God shall seek the driven-away.
16 And yet I saw under the sun the place of judgment,
There was the impious :
And the place of the righteous,
There was the pious.
17 And I said in my heart,
God judges the righteous and the impious :
For there is a season for everything
And for every deed, there.
18 I said in my heart concerning the talk of the sons of men,
That God judges them,
And to show that they are (but) beasts.

ASSYRIAN.

19 And indeed the end of the sons of men, and the end of the beasts,
There is one end to them (both).
As the death of this, so the death of that :
And one breath is in all.
And how doth man excel the beast?
Nothing : for all is perplexity.
20 All (go) to one place :
All came from the dust,
And all shall return to the dust.
21 And who has seen the spirit of the sons of man,

Whether it ascends?
Or the spirit of the beast,
Whether it descends below into the earth?
22 And I saw that there is no good for man
But that he should rejoice in his works,
Because this is his portion:
For who shall bring him to see
In what it shall consist after him?

SOLOMON.

4 Then I turned, and beheld all the oppressions,
That are done under the sun.
And, behold, the tears of the oppressed,
And there is no one comforting them:
And in the hand of those oppressing there is power,
But there is no one comforting them.
2 And I praised the dead who are already dead
More than the living who are yet alive.
3 Yea good above these two
Is he who has not yet been,
Who hath not seen all that is done,
The evil done under the sun.
4 And I beheld all the labor,
And all the manliness of the doing,
That this is envy of a man from his fellow.
This indeed is perplexity and grasping of wind.

TYRIAN.

5 The fool folded his hands
And ate his own flesh.
6 Better is a handful of rest
Than two handfuls of labor and grasping of wind.

SOLOMON.

7 And I returned, and saw perplexity under the sun.
8 There is one, and there is not a second:
For there is neither son nor brother to him:
And there is no end to all his labor:
For his eye is not sated with wealth.
And for whom do I labor:
And deprive my life from goodness?
This at least is perplexity, and an evil struggle.

TYRIAN.

9 Two are better than one:
To them is a good reward in their labor:

10 For if they fall, one shall raise his fellow :
But woe to the one when he shall fall,
And there is not the second to raise him :
11 And indeed if two sleep together they have warmth :
But the one, how shall he be warmed?
12 And if one be overcome,
The two shall stand against him (their enemy),
And a threefold cord shall not be quickly broken.

SOLOMON.

13 Better is a poor and wise servant (or youth)
Than an old and foolish King
Who knows not to give heed any longer.
14 For out of the house of bondsmen (this one) shall come forth to reign,
While even in his own kingdom (the other) has become poor.
15 I saw all the living under the sun
Walking with the youth the second (or successor),
Who shall stand instead of him.
16 There is no end to all the people,
To all that were before them :
And indeed the last shall not rejoice in him :
So that even this is perplexity and grasping of wind.

TYRIAN.

17 Keep thy foot as thou walkest to the house of God ;
And let thy sacrifice be (to be) near to hear
Rather than the gift of fools;
For they know not that they do evil.
5 Haste not with thy mouth,
And let not thy heart make haste
To bring a word before the Face of God :
For God is in the heaven above,
And thou upon the earth :
Therefore let thy words be few.
2 For a dream comes in abundance of trial,
And a voice of a fool in abundance of words.
3 According as thou shalt vow a vow unto God,
Delay not to pay it.
For there is no pleasure in fools :
Pay therefore what thou shalt vow.
4 Better for thee not to vow,
Than to vow and not to pay.
5 Let not thy mouth make thy flesh to sin,
And say not before God's Face that it is a mistake :
Lest God should be angry at thy voice,
And destroy the works of thy hands.

6 For (it is) in abundance of dreams and perplexities, and of many words,
That thou fearest God.

SOLOMON.

7 If thou seest the oppression of the poor,
And the ravaging of judgment and justice in a land,
Admire not this thing:
For there is a Lofty One to watch over the lofty,
And there are loftier ones than these.
8 And the abundance of the land over all (others)
Is the king of a well-tilled field.
9 The lover of silver shall not be satisfied with silver:
And who has loved their begettings in (its) abundance?
This indeed is perplexity.

TYRIAN.

10 In abundance of goods those eating them are multiplied:
And what manliness to him from it?
That it is the government of seeing (it) with his eyes.
11 Sweet is the sleep of the slave,
Whether he eat little or much:
12 But to the one abounding in wealth
There is that prevents him from sleep.

SOLOMON.

13 There is a sore evil which I have seen under the sun:
Riches kept for one's own for evil to himself,
And that riches is destroyed in an evil struggle;
And he hath begotten a son, and there is nothing in his hand.
14 As he came naked from the womb of his mother,
(Naked) he shall return to go as he came:
And nothing shall be left of his labor,
That he may go (with it) in his hand.
15 And this indeed is an evil sickness (sore evil),
That as he came so shall he go:
And what his advantage in what he labors for the wind?
16 And all his days are in darkness
And in grief and much rage
And in sickness and vexation

TYRIAN.

17 Behold what I have seen good:
It is good to eat and drink,
And to see good in all one's labor,
Wherein one may labor under the sun
The number of the days of his life
Which God hath given him: for this is his portion.

18 And indeed every man to whom God gives wealth and possessions,
And has permitted him to eat of it,
And to take his portion, and to rejoice in his labor,
This is the gift of God.
19 For he shall not remember the days of his life:
For God shall scatter him in the joy of his heart.

SOLOMON.

6 There is an evil which I have seen under the sun,
And it is great among men.
2 A man to whom God shall give wealth, possessions and honor,
And there lacks nothing which his soul may desire:
And God permitteth him not to eat of it,
But a stranger eats it.
This is perplexity, and an evil disease.

EGYPTIAN.

3 If a man shall beget a hundred (children)
And shall live many years,
And the days of his years be abundant,
Yet his soul shall not be filled with good,
And even he had no burial—
The untimely-born is better than he.
4 For into perplexity it came,
And into darkness it goes:
And in darkness its name shall be hidden.
5 For indeed it saw not the sun:
And he knew not rest:
(The advantage is) to this over that,
6 Though he lived the courses of a thousand years
And knew not good—
Do not all go to one place?

SOLOMON.

7 All the labor of man is for his mouth:
And yet his soul shall not be satisfied.
8 Because there is advantage to the wise man over the fool,
Therefore the poor man knows how to walk in presence of life.
9 Better is the sight of the eyes, than the longing in the soul.
This also is perplexity, and grasping of wind.

ASSYRIAN.

10 If anything has already been its name has been called:
And it is known what is man,
And he shall not be able to contend with the Stronger than he.
11 For there are many words which multiply perplexity.

7 What is the advantage to man?
For who knows what is good for man in life,
The number of his days of his perplexity?
For He hath made them in a shadow:
For who shall announce to a man
What shall be after him under the sun?

EGYPTIAN.

2 A good name is better than good ointment,
And the day of death than the day of birth.
3 It is better to go to the house of mourning than to the house of feasting;
For this is the end of every man,
And the living shall give good to his heart.
4 Anger is better than laughter:
For in severity of the face the heart shall be made better.

SOLOMON.

5 The heart of the wise is in the house of mourning,
But the heart of fools is in the house of joy.
6 Better to hear the rebuke of the wise
Than to listen to the song of fools.
7 Like the crackling of thorns under the pot,
So is the laughter of fools.

TYRIAN.

This also indeed is perplexity,
8 That oppression carries away a wise man
And destroys the heart of his nobleness.
9 Better is the end of strife than the beginning of it:
Better the patient than the proud in spirit.
10 Haste not in thy spirit to be angry:
For rage dwells in the bosom of fools.
11 Say not of what was, that former days were better than these:
For not in wisdom hast thou inquired about this.

SOLOMON.

12 Wisdom is better than an inheritance,
Yea, an advantage to those seeing the sun.
13 For in its shelter wisdom is as the shelter of silver:
And abundance of knowledge of wisdom shall make one alive through it.

ASSYRIAN.

14 Consider the works of God:
Who can adorn him whom God has overturned?

15 In the day of good live in the good :
And consider in the day of evil.
Consider indeed : God has made this harmoniously with that, concerning talk,
That man should find nothing beyond him.

TYRIAN.

16 I have seen all these things in my perplexity.
There is a righteous man, destroyed in his righteousness :
And there is a wicked man, remaining in his wickedness.
17 Be not righteous over much,
Nor be excessively wise—
Lest thou perish :
18 Be not wicked over much,
And become not hardened—
Lest thou die before thy time.
19 It is good to restrain thyself in this,
And indeed not to soil thy hand with that—
All things shall come to those who fear God.

SOLOMON.

20 Wisdom shall help a wise man
More than ten powerful ones in a city.

TYRIAN.

21 For there is no just man in the earth,
Who shall do right and not sin.
22 And indeed lay not to heart all words spoken by the wicked,
That thou hear not thy slave curse thee :
For very often it would do thee harm,
And afflict in many ways thy heart :
23 Because so also thou hast cursed others.

SOLOMON.

24 All these things have I proved in wisdom :
I said, I will become wise :
25 But she (wisdom) was far from me,
Beyond where she had been—
A depth of depth—who shall find it?
26 I turned about, I and my heart,
To know and to seek and to search out
Wisdom, and a sure calculation :
And to know the folly and hardness
And madness of the impious :
27 And I find it, and declare it more bitter than death.
Even as the woman who is a snare ;
Her heart is a net ;

Bonds are in her hands.
The good man before the Face of God
Shall be snatched away from her:
And the one sinning shall be taken with
28 Behold this did I find, said the Ecclesiast,
One by one to find a disputing;
29 Which my soul sought, and I found not—
And I found one man among a thousand,*
And a woman in all these I found not.
30 But behold this I found—
What God has done with man is right:
But they have sought many disputings.

EGYPTIAN, ASSYRIAN, TYRIAN.

Who knows the wise
And who knows the solution of the thing?

SOLOMON.

8 Wisdom enlightens a man's countenance:
And the shameless in his face shall be hated.
2 Watch the mouth of the King,
And haste not concerning the word of the oath of God.
3 Go from His Presence,
Stand not in wicked word:
For He shall do whatever He pleaseth,
4 As a King having authority:
And who shall say, What doest thou?
5 He that keeps the commandment
Shall not know an evil thing;
And the heart of the wise
Knoweth the season of judgment.
6 For to everything is a season, and a judgment:
So that the knowledge of a man is great to him.
7 For there is none who knoweth what shall be;
For how it shall be, who shall announce to him?
8 There is no one that hath power over the spirit,
That he may retain the spirit:
And there is no power in the day of death,
And there is no discharge in the day of (that) war:
And impiety shall not save that belonging to it.

TYRIAN.

9 This all have I seen:
And I applied my heart to every work,
Which is done under the sun:
In how many things man has authority over man to afflict him.

*See Proverbs viii and ix.

PROC. AMER. PHILOS. SOC. XXXIII. 146. 2 P. PRINTED DEC. 29, 1894.

10 Then I saw the impious borne to the graves,
And from the good they went away:
And they praised them in the city
Because they had done thus.

SOLOMON.

This also is perplexity,
11 That sentence against doers of evil is not swift:
Therefore the heart of sons of men is abundantly filled to do evil.
12 Whoever has sinned has done evil:
From that time is also away from their greatness.
For this I know,
That it is good to those who fear God:
That they may fear before His Face.
13 And there shall be no good to the impious:
And he shall not prolong his days in shade,
Who feareth not before the Face of God.

ASSYRIAN.

14 There is a perplexity wrought upon the earth,
That there are righteous,
To whom it happens as to the deed of the impious:
And there are wicked,
To whom it happens as (to) the deed of the just.
I have said that this indeed is perplexity.
15 And I praised mirthfulness:
For there is nothing good for a man under the sun
But that he should eat and drink and rejoice:
And this shall be his advantage
In his labor all the days of his life,
Which God has given him under the sun.
16 In which I gave my heart to know wisdom,
And to behold the struggle made upon the earth:
For both day and night
There is no one seeing sleep with his eyes.
17 And I beheld all the work of God,
That a man shall not be able to find out thoroughly
All the work done under the sun.
Though a man should labor to seek,
Yet shall he not find out:
However a wise man may say he knows it,
He shall not be able to find it.
For to all this I gave my heart:
And my heart hath known all this.
9 As well the righteous and the wise,
As their works, are in the hand of God:
And so also love and hate.

There is no man hath known all things before their face :
Perplexity in them all.
2 There is one ending to the righteous and impious,
To the good and to the wicked :
To the clean and the unclean,
To the sacrificer, and to him that sacrificeth not :
As is the good, so is the sinner :
As the swearer, so the one fearing an oath.

SOLOMON.

3 This were an evil in all done under the sun
That there were one end to all.
And indeed the heart of the sons of men has been filled with evil :
And madness is in their hearts during their life,
And after them among the dead.
4 For who is He that gives to all the living?

TYRIAN.

There is hope for the living dog :
He is better than the dead lion.
5 For the living know that they shall die,
But the dead know not anything.
And there is no longer for them a hire,
For their memory has been blotted out.
6 And even their love and their hate,
And their desire has perished.
And there is no portion still forever
In all done under the sun.
7 Go : eat in mirth thy bread :
Drink in good heart thy wine :
God is well pleased with thy doings :
8 Be clothed at every season in white garments,
And stint not oil on thy head :
9 And see life with the wife whom thou lovest,
All the days of the life of thy perplexity,
Which has been given thee under the sun ;
For this is thy portion in thy life,
And in the labor thou laborest under the sun (!)
10 Whatsoever thy hand findeth to do
Do it with thy might
For there is no deed nor reasoning
Nor knowledge nor wisdom
In Hades, whither thou goest (!)

SOLOMON.

11 I returned : and saw under the sun
That not to the swift is the race,

Not to the mighty the battle,
Not to the wise man bread,
Not to the prudent wealth,
Not to the knowing favor :
For season and chance happen to them all.
12 For indeed a man has not known his season :
Like the fishes taken in an evil net
And like birds captured in a snare,
So are snared the sons of men in an evil season.
When it falls upon them suddenly.

ASSYRIAN.

13 And indeed I saw this wisdom under the sun,
And it is great to me.
14 If a city be small and the men in it few,
And a great king come against it
And besiege it and build great bulwarks against it
15 And there be found in it a poor wise man,
And he save the city by his wisdom,
No man remembered the poverty of that man.
16 And I said, Wisdom is greater than power :
And yet the wisdom of the poor man is scouted,
His words are not listened to.

SOLOMON.

17 The words of the wise are heard in refreshment
More than the shoutings of rulers among fools.
18 Wisdom is better than weapons of war ;
And one sinner will destroy much good :
10 (So) dead flies corrupt the preparation of oil of fragrance.
Better a little honor for wisdom
Than great glory for folly.

EGYPTIAN.

2 The heart of the wise is at his right
But the heart of the fool at his left.
3 Indeed, whenever the fool goeth in the way
His heart falleth him :
Whatever he thinks it is folly.
4 If the spirit of the ruler rise against thee
Leave not thy place :
For forbearance heals great sins.

TYRIAN.

5 There is an evil which I have seen under the sun :
As something not intended it proceeded from the face of the ruler
6 A fool was presented with great exaltations :
And the wealthy shall sit with the humble.

7 I saw slaves upon horses,
And rulers walking as slaves on the earth.

ASSYRIAN.

8 The digger of a ditch shall fall into it:
And a serpent shall bite the destroyer of a hedge.

EGYPTIAN.

9 The remover of stones shall be hurt by them:
The splitter of wood shall be endangered by it.

TYRIAN.

10 If the axe fail, he has disturbed its face,
And he must labor labors:
That man's wisdom is not excessive.
11 If a serpent bite through not having been charmed,
There is no advantage to the charmer.

SOLOMON.

12 The words of the mouth of the wise are grace:
But the lips of the fool shall drown him.
13 The beginning of the words of his mouth is folly,
And the last of his mouth is wicked madness:
14 And the fool multiplies words.

ASSYRIAN.

Man knoweth not what hath been
Nor what shall be:
For (that which comes) after who shall tell him?
15 The labor of fools afflicts them:
He knoweth not how to go to the city.

TYRIAN.

16 Woe to thee, city,
Whose king is young,
And whose rulers eat in the morning!
17 Happy thou, O land,
Whose king is son of the free,
Whose rulers eat in season,
For strength, and shall not be ashamed!
18 Through sloth the roof will be abased,
And in idleness of hands the house will leak.
19 For laughter do they prepare bread and wine,
And oil to make glad the living:
And to the expenditure of silver
Shall all things be obedient.

EGYPTIAN.

20 And indeed curse not the King in thy thought,
In thy bedchamber curse not the rich:
For a bird of the air shall carry thy voice,
And that which has wings shall tell thy speech.
11 Cast thy bread upon the face of the waters:
For in fullness of days thou shalt find it.
2 Give a portion to seven, aye to eight:
For thou knowest not what evil shall be on the earth.

ASSYRIAN.

3 If the clouds be full of rain
They empty themselves on the earth:
Whether the tree falls to the South
Or whether it falls to the North,
In the place where the tree falls
There it shall be:
4 The one watching the wind sows not,
The one gazing at the clouds shall not reap:
5 In which there is none who knows the way of the spirit.

SOLOMON.

As the bones (grow) in the womb of a woman with child
So thou knowest not the works of God,
All the things that He doeth.
6 In the morning sow thy seed,
And in the evening hold not thy hand:
For thou knowest not which shall flourish,
Whether this or that:
Or whether both shall be alike good.
7 Sweet is the light,
And good to the eyes to behold the sun:
8 For if a man should live many years,
Let him rejoice in them all:
Yet let him remember the days of darkness,
For they shall be many:
All that cometh is perplexity.
9 Rejoice, oh young man, in thy youth:
And let thy heart cheer thee in the days of thy youth:
And walk blameless
In the ways of thy heart,
And not in the sight of thine eyes:
And know that in all these things
God will bring thee into judgment.
Therefore put away wrath from thy heart,
10 And remove wickedness from thy flesh:
For youth and thoughtlessness are perplexity.

12 And remember thy Creator
In the days of thy youth :
Before the evil days come
And the years touch, when thou shalt say
I have no pleasure in them.
2 Before the sun and the light be darkened,
And the moon and the stars ;
And the clouds return after the rain.
3 In the day when the keepers of the house tremble,
And the men of might are turned aside,
And the grinders cease because they are few,
And those looking out of the windows shall be darkened,
4 And they shall close the doors in the street,
In weakness of voice of the grinder ;
And he shall rise at the voice of the ostrich,
And all the daughters of song shall be abased.
5 And they shall look to the height,
And terrors be in the way :
And the almond shall blossom,
And the grasshopper be heavy,
And the caper-berry be scattered :
Because a man has gone to the house of his eternity,
And the mourners have gone about the streets.
6 Or ever the silver cord be untwisted :
Or the golden bowl broken :
Or the pitcher be broken at the spring :
Or the wheel overturned at the cistern :
7 Or the dust returned to the earth as it was,
And the spirit returned to God who gave it.

SUMMING UP BY THE PRESIDING OFFICER.

8 Perplexity of perplexities, as said the Ecclesiast,
All is perplexity.

9 And moreover because the Ecclesiast was wise,
Because he thoroughly taught man knowledge,
And the ear shall trace out the adornment of parables,
10 The Ecclesiast sought many things
To find acceptable words,
And the writing of correctness,
Words of truth.

11 The words of the wise are as goads,
And as spikes well planted :
They of the assemblies
Gave them from one shepherd.

12 And moreover by them my son, be warned:
Of making many books there is no end:
And much anxious thought
Is a weariness of the flesh.

The end of the discourse, the whole, listen to:
13 Fear God:
And keep His commandments:
For that is the whole (of) man.
14 For God will bring every deed into judgment:
With every hidden thing,
Whether it be good
Or whether it be evil.

The Atomic Mass of Tungsten.

By Mary E. Pennington and Edgar F. Smith.

(*Read before the American Philosophical Society, November 2, 1894.*)

A study of the literature relating to this subject discloses the fact that while, in most instances, every effort was made to eliminate foreign matter from the material employed in the numerous investigations which have been conducted at various times, several doubtful points continue. The object of this communication is to direct attention to one of these possible sources of error, viz., the presence of traces of molybdenum, and to present results obtained after its evident removal.

The earlier investigations relating to the atomic mass of tungsten are rather numerous; but of these that of Schneider is without doubt deserving of the most confidence, chiefly for the pains taken in preparing pure material for the later experiments. The author offers satisfactory evidence of the absence of possible contaminating substances, and in writing of the presence of molybdenum employs these words: "Molybdän endlich nicht, weil die Molybdänsäure in heftiger Glühhitze flüchtig ist" (*Journ. prakt. Chemie, 50*, p. 158). The experience of chemists generally is that a complete separation of tungsten trioxide from molybdenum trioxide cannot be attained in this way. Indeed, an examination of the experiments recorded by Schneider discloses the fact that he, while engaged in reducing strongly ignited tungsten trioxide, several times discovered on the anterior portion of the reduction or combustion tube "ein weissliches Sublimat." This sublimate Schneider attributes to tungsten chloride, but the question may well be asked, Was it not molybdic acid?

Waddell has made the most recent contribution to our knowledge upon the atomic mass of tungsten (*Amer. Chem. Journ., 8*, 280). He experi-

enced much difficulty in obtaining pure tungsten trioxide. He found by considerable investigation that Rose's method for the separation of molybdenum and tungsten was the most convenient. Traube (*Jahr. für Mineralogie*, etc., Beilageband, 7, 232) and more recently Friedheim (*Z. für anorg. Chemie*, *1*, 76) has shown that this procedure does not entirely eliminate the molybdenum. Recent investigations, in this as well as in other laboratories, upon artificial and supposedly pure, as well as natural tungstates have proved that these all contain molybdenum in appreciable amounts, and it may well be questioned whether the earlier determinations of the atomic mass of tungsten were not affected by the presence of traces of molybdenum. Its complete and absolute removal would tend to raise the value of this constant of tungsten. An effort to this end appeared to be desirable.

An attempt was first made to free the trioxide from impurities through the sodium salts. This course was abandoned inasmuch as traces of alkali persistently adhered to the tungsten. This fact is not new ; Schneider was fully aware of it, and in consequence he had recourse to another method, which was also adopted in this investigation with some modifications.

A quantity of tungsten trioxide, derived from wolframite, was heated in a porcelain dish for three days with concentrated nitric acid. The latter was then decanted and the yellow oxide was well washed with water. It was next subjected to the action of boiling *aqua regia* for the same length of time, the acid solution, however, being removed from time to time. The washings and acid liquor were tested for iron. When this was no longer detected the washed trioxide was dissolved in yellow ammonium sulphide, air being excluded as much as possible. The solution was filtered from insoluble material, and concentrated almost to the point of crystallization, when hydrochloric acid was added. The liquid was removed from the resulting precipitate, which was ignited, then boiled with nitric acid, and later with *aqua regia*. The resulting trioxide no longer showed the presence of iron and manganese. It was then washed, brought into a porcelain dish, covered with distilled water and ammonia gas conducted over the liquid until it was saturated. Several days were required for this purpose. Only a very small residue remained undissolved. It contained a trace of silica and a little greenish-yellow oxide. Hydrogen sulphide gas was next introduced into the ammoniacal solution, which was then digested at 80° C., for several hours. On the addition of pure dilute hydrochloric acid to this solution tungsten trisulphide was precipitated. This was filtered out, washed and roasted in a large porcelain crucible with air access. The trioxide prepared in this manner no longer contained silica, iron or manganese. If tin had been originally present it would have gone out with the *aqua regia*, and any columbic acid would have remained when the trioxide was subjected to the ammonium sulphide treatment. The next step was to prove the presence or absence of molybdenum. A portion of the purified tungsten trioxide was converted into the ammonium salt and the sulphocyanide test

(Braun, *Zeit. f. Analyt. Chemie, 2*, 36) for molybdenum applied to its aqueous solution. The presence of molybdenum was very evident. The ignition of the tungsten trioxide in the earlier stages of purification had not eliminated this constituent. Instead of adopting Rose's method as was done by Waddell, and thus introducing the possible contamination from a fixed alkali, recourse was had to the reaction of Debray—the volatilization of the molybdic acid as oxychloride—MoO_3. 2HCl (*Compt. rend., 46*, 1098, and Liebig's *Annalen, 108*, 250). The experiments of Péchard (*Compt. rend., 114*, 173, and *Zeit. f. anorg. Chemie, 1*, 262), as well as those more recently made by Smith and Oberholtzer (*Journ. Am. Chem. Soc., 15*, 18, and *Zeit. f. anorg. Chemie, 4*, 236), and by Smith and Maas (*Journ. Am. Soc., 15*, 397, and *Zeit. f. anorg. Chemie, 5*, 280), give evidence that by this means molybdenum can be expelled from tungsten derivatives. To this end the remainder of the tungsten trioxide was placed, in portions, in a porcelain boat and exposed to the action of hydrochloric acid gas, aided by a gentle heat (150–200° C.), until a volatile sublimate of MoO_3. 2HCl was no longer noticed. Upon reoxidizing the residual tungsten trioxide in open porcelain crucibles and then subjecting portions of the same to the sulphocyanide test the presence of molybdic acid was no longer observed. This was taken as an evidence of its complete removal.

The trioxide subjected to the treatment described in the last paragraph was suspended in water into which ammonia gas was conducted. The oxide dissolved without leaving a trace of foreign matter. The salt obtained upon evaporation was crystallized three times; it was then dried and ignited with careful exclusion of dust. This material was now regarded as sufficiently pure for the experiments projected. As it was not intended to attempt any determinations by reduction of the oxide, the latter was reduced in a current of hydrogen, carefully purified, to the metallic state. The reductions were made in a large platinum crucible after the manner of Von Pfordten (*Ber. d. deutsch. Chem. Gesell., 17*, 731). Inasmuch as the reduced metal slowly alloys with the platinum the resulting metallic powder was in all instances gently shaken from the crucible after it had cooled in a current of hydrogen. The reduction of trioxide proceeds quite rapidly in the above manner and is always complete. The product is dark gray in color. Its specific gravity was found to be 18.64 at 0°. It was carefully preserved from dust and moisture in drying bottles.

The amount of oxygen absorbed by the conversion of tungsten into its trioxide was made the basis of the determinations recorded in this paper.

The oxidations were made in porcelain crucibles. These were supported in close-fitting asbestos rings so that reducing gases could not gain access to the hot oxide. To avoid loss from particles being carried out mechanically a porcelain lid wider than the crucible was placed over it, at the height of one-half inch. A careful examination of this lid from time to time showed no traces of tungstic oxide. Dust particles were also excluded in this manner. No other work was done in the room in

which these oxidations were performed. All draughts were avoided. The crucibles were handled with nickel crucible tongs. They were allowed to cool in vacuum desiccators over sulphuric acid. Calcium chloride cannot apparently be used for this purpose, at least a superficial greenish tinge was always noticed on the oxide cooled in this way. Direct sunlight also causes a reduction of the trioxide, therefore the desiccators were kept covered with a black cloth.

At the beginning of each oxidation the flame applied was quite small. The metal increased in bulk as it oxidized, and in five minutes had assumed a light yellowish-green color. At the expiration of half an hour the heat was increased. Later a stronger heat was allowed to act and continued until the oxidation was finished. The first period of each oxidation continued through five hours. The crucible and contents were cooled and weighed. The second period lasted three hours additional, after which the crucible was allowed to cool. It was again weighed, and even if there was no change in weight from that first recorded, the ignition was continued for two hours more. The third weight, if constant, was taken as final. Each oxidation, therefore, was not considered finished until it had been continued through a period of at least ten hours.

The weighings were made upon a Becker balance with weights, which had been adjusted for this work. The vacuum standard was observed, and oxygen taken equal to sixteen in all the calculations. The results were as follows:

	WEIGHT OF TUNGSTEN IN GRAMS.	WEIGHT OF OXYGEN IN GRAMS.	ATOMIC MASS OF W.
1.	0.862871	0.223952	184.942
2.	0.650700	0.168900	184.923
3.	0.597654	0.155143	184.909
4.	0.666820	0.173103	184.902
5.	0.428228	0.111168	184.900
6.	0.671920	0.174406	184.925
7.	0.590220	0.153193	184.933
8.	0.568654	0.147588	184 943
9.	1.080973	0.280600	184.913
	Mean.....		184.921

Maximum.....	184.943
Minimum.....	184.900
	.043

Clarke (*Recalculation of the Atomic Weights*, 1882, Washington) and Becker (*Atomic Weight Determinations*, 1880, Washington) in their recalculations of this constant of tungsten both arrive at the figures 184.02

(O=16), while Ostwald (*Outlines of General Chemistry*, translated by Walker, 1890, p. 30) says, "the mean of the good determinations is W=184" Waddell (*Amer. Chem. Jr.*, *8*, 280) gives as the mean of his determinations 184.5 (O=16). The results presented in this communication show, therefore, a wide difference from those usually looked upon as most correct.

The evidence in earlier papers of the absence of molybdenum from the tungsten is far from satisfactory. Waddell recognizes this; hence he employs Rose's method for the removal of molybdenum from his starting-out material. Since the publication of his research other experimenters have declared and proved the insufficiency of this method (Traube, Friedheim, *loc. cit.*) for the purpose to which Waddell applied it. For this reason the Rose method was not followed in this present investigation, as well as from fear that it might introduce alkali, difficult to eliminate. As a substitute for it the method of Debray was adopted.

In considering the factors that possibly could have caused a rise in the atomic value other than that occasioned by the complete removal of molybdenum, two suggest themselves. First, the occlusion of hydrogen by the finely divided metallic tungsten, upon cooling in that gas, would produce such a result. Waddell (*loc. cit.*) by one experiment is satisfied that such gas occlusion does not occur. Derenbach (*Inaug. Dissertation*, Würzburg, 1892) claims that there is an appreciable retention of hydrogen by the finely divided metal. The question is therefore one of importance, and while this communication contains no data on this point, yet if an occlusion equal to that claimed by Derenbach (*Dissertation*, p. 43) be granted to have occurred in each experiment recorded in this investigation the final result would not be equal to that actually obtained. We must therefore look further for the cause of the rise in the atomic value. The reductions of the trioxide were made in a platinum vessel. An examination of the metallic tungsten for platinum did not show its presence.

Again, tungsten trioxide volatilizes slightly at elevated temperatures; its escape would operate to augment the final value of the tungsten constant. There is, however, no evidence that loss in this way did occur, for the porcelain lid suspended over the crucible during the long ignition period never showed the presence of trioxide. Even if such a volatilization had taken place, it is not at all probable that three weighings could have been made with no change in the same. Furthermore, the remarkable concordance of the individual results among themselves precludes the idea that the rise in the found atomic mass is attributable to volatilization of trioxide. In the end it seems most reasonable to assume that the new value is due to a full and complete elimination of the last traces of molybdenum from the tungsten prior to its oxidation.

Chemical Laboratory, University of Pennsylvania,
November, 1894.

The Atomic Mass of Tungsten.

By Edgar F. Smith and En. D. Desi.

(*Read before the American Philosophical Society, November 2, 1894*).

Most of the experiments made to determine this constant consist in reduction of the trioxide and the subsequent oxidation of the metal. Two experimenters have attempted to weigh the water produced in the reduction of the trioxide. A. Riche (*Annal de Chim. et de Phys.*, (3) *50*, 10, 1857) made five such trials. The atomic mass of tungsten, deduced from his experiments, equals 174 (O=16). Three years later Bernoulli (*Pogg. Ann.*, iii, 599) made two experiments and his recorded value for the constant is 186+. In both instances there is considerable variation in the individual results.

In a previous paper by Pennington and Smith a value (184.9) was obtained that differs quite appreciably from that usually accepted as representing the true atomic mass of the element under discussion. We have undertaken in this present investigation to determine the atomic value from the quantity of water formed in the reduction of the trioxide chiefly for the purpose of ascertaining whether the elimination of the last traces of molybdenum would likely produce the great rise in atomic mass. It will be remembered that great stress was laid upon this point by Pennington and Smith. In the preparation, therefore, of our trioxide we adhered closely to their method of purification and observed all precautions laid down by them. For details, therefore, we would refer the reader to their paper.

The hydrogen used by us in the reductions was prepared from sulphuric acid and the purest zinc obtainable. To purify the gas it was conducted through a series of bottles containing potassium permanganate, an alkaline lead nitrate solution, silver nitrate, caustic potash, sulphuric acid, calcium chloride, and finally through a glass tube nine inches long, filled with bright, polished iron wire. The latter was heated constantly with a Bunsen burner. After this the gas was admitted to the tube where it came in contact with the ignited trioxide, contained in a platinum boat. The water produced in the reduction was collected in a weighed, glass-stoppered U-tube, filled with anhydrous calcium chloride. A similar tube was attached to this to prevent absorption of moisture from the surrounding atmosphere.

All weighings were reduced to the vacuum standard, and in the calculations oxygen was taken as *16* and hydrogen as 1.008 (Clarke).

Results.

WO_3	H_2O	AT. MASS W.
0.983024	0.22834	184.683
0.998424	0.23189	184.709
1.008074	0.23409	184.749
0.911974	0.21184	184.678
0.997974	0.23179	184.704
1.007024	0.23389	184.706
	Mean.....	184.704

Maximum.....	184.749
Minimum.....	184.678
Diff.....	.071

The mean *184.704* falls below that given by Pennington and Smith. The discrepancy may possibly be due to the method, or the personal factor entering into the work may account for it. However, the result we believe clearly proves that the atomic mass of tungsten is certainly greater than what is generally assumed as correct, and in all likelihood the molybdenum contained in the tungsten has caused the low values found by previous experimenters.*

CHEMICAL LABORATORY, UNIVERSITY OF PENNSYLVANIA,
November, 1894.

Notices of Presumably Undescribed Infusoria.

By Dr. Alfred C. Stokes.

(*Read before the American Philosophical Society, November 2, 1894.*)

Salpingœca globosa, sp. nov. (Fig. 1).—Lorica pedicellate, carafe-shaped, the body subspherical, tapering at the posterior extremity to the pedicle; neck conspicuous, about one third as long as the body of the lorica, the margin flaring; pedicle often oblique, somewhat flexuous, and about as long as the entire lorica. Solitary. Length, $\frac{1}{2250}$ inch. *Hab.*—Fresh water, near Trenton, N. J.; attached to filamentous algæ.

Salpingœca collaris, sp. nov. (Fig. 2).—Lorica vasiform, less than four times as long as broad, but divisible by its characteristic contour

*A review of all the methods heretofore used in determining the atomic mass of tungsten has been begun by one of my assistants. Care is being taken to completely eliminate certain sources of error which have not been absolutely excluded in earlier work. —E. F. S.

into two regions, a posterior, inflated, obovate portion, tapering to the pedicle, and an anterior region, subcylindrical, somewhat exceeding the posterior region in length, its lateral margins parallel, the anterior aperture circular, its borders everted; pedicle usually exceeding the lorica in length; enclosed animalcule freely motile within the lorica, at times situated exclusively within the frontal, neck-like portion, at others extending into the anterior region of the posterior part of the sheath; when disturbed retreating into the posterior region, and advancing to the frontal portion when its fright has passed, the sarcode then completely filling that part of the lorica and taking its shape. Length of lorica $\frac{1}{1200}$ inch. *Hab.*—Standing water from the Morris and Essex canal, New Jersey.

The water in which this beautiful and characteristic form was found was taken from the canal late in the autumn of 1891, by Mr. S. Helm, of New York city, and by him sent to me. It remained on my table until February 17, 1892, almost unnoticed, except that a little water was occasionally added to supply that lost by evaporation. On the date last mentioned the animalcule was found in some abundance, attached to various submerged fragments and in company with a profusion of *Salpingœca gracilis* J. Clk., a form which it somewhat resembles, and near to which it should be classified.

Prorocentrum hæmatum, sp. nov. (Fig. 3).—Body ovate, less than twice as long as broad, smooth, depressed, the lateral borders slightly flattened, the posterior margin evenly rounded and obtusely pointed; dorsal surface convex; ventral aspect somewhat flattened, bearing on its frontal margin a stout, anteriorly projecting, obtusely pointed, often colorless process, which is bent hook-like almost at a right angle, directed towards the left-hand side and slightly excavated dorsally, thus exhibiting a ledge-like or shelf-like projection towards that aspect of the body; frontal border truncate, surrounded, within the margin, by an annular groove, the right-hand and left-hand ventral continuations of which extend obliquely along the adherent posterior prolongation of the frontal process and unite to form a subcentral, longitudinal ventral depression; anterior flagellum spirally undulating, taking its origin from within the ventral portion of the anterior groove, on the left-hand side of the posterior prolongation of the hook-like process, and extending round the frontal border into the groove on the right-hand side of the frontal projection; ventral flagellum long, trailing, vibratile, taking its origin from near the central region of the ventral groove; nucleus subspherical, located near the posterior extremity, often with an apparently amylaceous corpuscle on one side and near it. Chromatophores linear, elongate, vermicular or variously curved. Length, $\frac{1}{600}$ inch. *Hab.*—Brackish water from a salt marsh on Coney Island, N. Y. Movements rotary on the longitudinal axis. Abundant.

This form was collected and sent to me by Mr. H. C. Wells, of Short Hills, N. J.

Although *Trachelomonas* is probably not an infusorian, the following descriptions are here included for convenience.

Trachelomonas fusiformis, sp. nov. (Fig. 4).—Lorica fusiform, three times as long as broad, punctate with minute, scattered, conical elevations which are larger and more conspicuous near the margin of the posterior prolongation; anterior region narrowed, neck-like, the frontal border slightly everted, the margin minutely denticulate; color brown. Length of lorica, $\frac{1}{375}$ inch. *Hab.*—Pond water, near Trenton, N. J.; movements tremulous and rotary on the longitudinal axis.

Trachelomonas sphærica, sp. nov. (Fig. 5).—Lorica subspherical, somewhat depressed, the anterior aperture produced into a short, cylindrical, neck-like region, its frontal margin with four or more obtuse denticulations; entire surface of the lorica armed by long, conspicuous, obtuse spinous processes, the largest of which are subequal in length to the length of the neck-like portion of the sheath; color reddish brown; flagellum in length equaling or exceeding the circumference of the lorica. Diameter, including the length of the spinous processes, $\frac{1}{800}$ inch. *Hab.*—Pond water, with *Lemna*, near Trenton, N. J. Movements rapidly rotary.

Trachelomonas acanthophora, sp. nov. (Fig. 6).—Lorica fusiform, about twice as long as broad, the posterior region somewhat suddenly contracted into a short, naked, punctate or smooth, prolongation, terminated by three diverging spines; anterior region produced as a neck-like portion, naked and punctate or smooth, the anterior border truncate, the margin bearing four or more radiating spines; central or body-region armed by numerous, conical, spine-like prolongations; flagellum equaling or exceeding the lorica in length; endoplasm green. Length of lorica, including spines, $\frac{1}{300}$ inch; width, without spines, about $\frac{1}{1200}$ inch. *Hab.*—Pond water, with *Lemna*, near Trenton, N. J. Movements rotary on the longitudinal axis.

Vaginicola longipes, sp. nov. (Figs. 7, 8).—Lorica trumpet-shaped, much compressed, rather more than four times as long as broad, widest and inflated near the middle third, thence tapering posteriorly to a narrow, irregularly subcylindrical region forming from one-third to one-half of the entire length of the lorica; anterior border slightly everted, the lateral margin somewhat constricted beneath the frontal region; lorica often irregularly constricted, the posterior, pedicle-like portion frequently curved, and variously contorted, bent or irregularly inflated, the whole becoming chestnut-brown with age; enclosed animalcule adherent posteriorly to a long, narrow pedicle apparently attached to the posterior extremity of the lorica, but often there becoming indistinct, and at times seemingly adherent to one lateral margin; body soft and flexible, finely striate transversely, extending slowly and irregularly, often undulate or vermicular in form, the contracted anterior region bending posteriorly, the flexure thus produced advancing towards the anterior aperture of the lorica, the unexpanded peristomal region apparently wedged against the lateral borders of the sheath, the animalcule thus remaining until another

contraction changes its position ; extended body elongate, very narrow, projecting for from one-third to one-half its length, or more, beyond the frontal aperture ; peristome broad, somewhat oblique ; contracted body obovate ; nucleus elongate, narrow, band-like, exceedingly tortuous during the contracted state of the animalcule ; contractile vesicle single, spherical, anteriorly situated. Length of lorica, about $\frac{1}{700}$ inch. *Hab.*—Attached to aquatic plants from Rancocas creek, at New Lisbon, N. J.

Caulicola (*caulis*, stem ; *colo*, to inhabit), gen. nov.—Animalcules loricate, as in *Thuricola*, except that the lorica is conspicuously pedicellate, and possesses a valve-like appendage which is not attached to the wall within the lorica, as in *Thuricola*, but to the lateral margin of the anterior aperture.

Caulicola valvata, sp. nov. (Fig. 9).—Lorica ovate, less than twice as long as wide, posterior border rounded, somewhat inflated, thickened centrally and with a short, posterior projection at its point of attachment to the pedicle ; lateral walls often slightly undulate, and usually narrowed at the truncate, anterior aperture ; valve-like appendage attached to the lateral border of the anterior aperture, rising by the pressure of the extending animalcule, and when fallen, completely closing the orifice by a horizontal, flat-topped lid ; pedicle slender, thickened centrally, and with a short anterior projection at its point of attachment to the lorica, tapering posteriorly, and about one-third as long as the lorica ; body of enclosed animalcule colorless, transparent, and when extended, protruding about one fourth of its length beyond the lorica ; cuticular surface transversely striate ; nucleus elongate, band-like. Length of lorica, $\frac{1}{500}$ inch. *Hab.*—Brackish water from Coney Island, N. Y. Collected and sent to me by Mr. H. C. Wells, of Short Hills, N. J.

Bicosœca phiala, sp. nov. (Fig. 10).—Lorica elongate-vasiform, less than twice as long as broad, widest anteriorly, tapering posteriorly to the pedicle ; anterior margin everted, truncate ; lateral borders often almost rectilinear ; pedicle short ; enclosed animalcule not exserted ; contractile vesicles two or more, often four, near the posterior extremity ; nucleus not observed. Length of lorica, $\frac{1}{1285}$ inch. *Hab.*—Pond water from near Trenton, N. J. ; attached to filamentous objects.

Enchelyodon vesiculosus, sp. nov.—Body elongate-ovate, one lateral border somewhat concave, the other convex ; both extremities rounded, the anterior somewhat truncate ; soft, flexible and changeable in shape ; about twice as long as broad, the cuticular surface longitudinally striate, entirely ciliate ; pharynx obconical, about one-third as long as the body, longitudinally plicate, the anterior orifice transversely oval ; nucleus apparently subspherical or broadly oval, subcentrally located ; contractile vesicles three or more, near the posterior extremity ; anal aperture postero-terminal ; endoplasm enclosing numerous, green corpuscles which obscure the internal structure, and render the body semi-opaque. Movements rotary on the longitudinal axis. Length of body, $\frac{1}{100}$ inch. *Hab.*—Pond water in early spring, from near Trenton, N. J.

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This form differs from *E. farctus* C. & L., in the presence of the multiple contractile vesicles and in the single, rounded nucleus, the latter in *E. farctus* being recorded as band-shaped.

The infusorian was obtained in abundance in a gathering made in the middle of February in the mild winter of 1889-'90. Reproduction is by transverse fission.

Nassula trichocystis, sp. nov. (Fig. 11).—Body elongate-ovate or subelliptical, cylindrical, more than twice as long as broad, the two extremities subequal; oral aperture near the anterior extremity, in a slight depression or concavity of the lateral body-margin, and followed by a conspicuous, conical, pharyngeal rod-fascicle extending to near the body-centre; oral cilia somewhat larger and more conspicuous than those of the general surface; contractile vesicle single, spherical, laterally placed in the posterior part of the anterior body-half, often leaving small lacunæ at complete systole; nucleus subspherical, subcentrally located; trichocysts exceedingly abundant, obliquely and densely set within the cortical layer; endoplasm frequently exhibiting a movement of rotation. Length, $\frac{1}{175}$ inch. *Hab.*—Pond water, near Short Hills, N. J. Movements rotary on the longitudinal axis.

This form, which is interesting on account of the remarkable abundance of trichocysts enclosed by the cortex, was collected by Mr. H. C. Wells, of Short Hills, N. J., and by him sent to me.

Urostyla vernalis, sp. nov. (Fig. 12).—Body elongate-ovate, or subelliptical, soft and flexible, about three times as long as broad, both extremities rounded, the anterior somewhat curved towards the left-hand side and slightly narrowed; posterior extremity sometimes evenly convex, frequently obtusely pointed on the right-hand side of the median line; dorsal aspect convex, its cuticular surface irregularly roughened by clusters of minute, rounded elevations arranged in irregularly longitudinal series; lateral body-margins of the larger infusorians often flattened and subparallel, those of the smaller forms convex; upper lip crescentic; peristome field obovate, the anterior region of the adoral depression proper not including any portion of the frontal border, but taking its origin posteriorly to that margin, at a distance about equal to one-tenth the length of the entire body, and extending on the left-hand side of the body somewhat obliquely backward towards the right-hand side for about one-third the length of the ventral surface, its left-hand margin bearing a series of large and conspicuous adoral cilia, and a row of finer par-oral cilia, the right-hand border supporting an undulating membrane and a series of fine pre-oral cilia; endoral cilia none; uncinate frontal styles from four to six, distally bifid and somewhat irregularly placed near the right-hand border of the peristome field; ventral surface clothed by fine, vibratile cilia in six parallel, longitudinal lines; marginal setæ longest, largest and most conspicuous on the posterior border, where they are slightly interrupted, those on the two sides of the median line of the body usually directed towards one another and frequently overlapping; anal styles slender,

fimbriated, from six to eight in number, arranged in an oblique row and not projecting beyond the body-margin ; contractile vesicle single, spherical, near the left-hand side of the anterior body-half, in the dorsal aspect, the cuticular surface of which it elevates at its systole, and through which it seems to discharge its contents ; nucleus double, the two nodules ovate, one being in the anterior, the other in the posterior body-half, near the left-hand body-margin, and each bearing a laterally attached nucleolus ; anal aperture not observed. Length from $\frac{1}{100}$ to $\frac{1}{75}$ inch. *Hab.*—Shallow way-side pools in the early spring, near Trenton, N. J. Reproduction by transverse fission. Endoplasm brown.

This form bears a somewhat close resemblance to *Urostyla trichogaster* Stokes, but differs conspicuously in its habitat, *U. trichogaster* being found in infusions of decaying vegetable matters, the present species in the clear, pure waters of the pools of early spring. It also differs in the character of the adoral depression which does not include a part of the frontal border of the body ; in the absence of the endoral cilia, and especially in the fewer frontal styles.

The body is exceedingly soft and flexible, and its motions active. The brown endoplasm is often of a beautiful, transparent golden tint. The favorite food is the algal spores and the other small vegetal objects with which the shallow pools are at this time of the year so well supplied, while the food of *U. trichogaster* is chiefly animal.

Acineta corrugata, sp. nov. (Figs. 13, 14, 15).—Lorica ovate or subtriangular, compressed, the length but slightly exceeding the greatest breadth ; lateral margins convex, tapering towards the pedicle and variously crenated, or almost smooth and even ; general surface bearing numerous, irregularly disposed but frequently parallel and centrally converging, linear ridges, that vary in number, arrangement and general direction with the age of the lorica, in maturity and in old age the interlinear spaces becoming exceedingly prominent as inflated, rounded and elongated prominences, the lateral borders of the lorica then being conspicuously and irregularly crenate ; anterior margin slightly elevated centrally, this elevation extending perpendicularly along the subcentral region of the frontal and of the dorsal aspects of the sheath, this in transverse, subcentral optical section having a rhomboidal outline, the lateral borders truncate and emarginate ; anterior border of the lorica closed in except for a narrow, slit-like aperture traversing it, and an ovate orifice at each antero-lateral margin for the passage of the fasciculate, capitate tentacles ; frontal region, in surface view, compressed and undulate, or with six oppositely disposed, concave depressions ; pedicle conspicuous, well-developed, hollow and about one-third as long as the lorica ; nucleus apparently broadly ovate and subcentrally located ; endoplasm coarsely granular ; the enclosed animalcule usually nearly filling the cavity of the sheath. Length, including pedicle, $\frac{1}{450}$ inch. *Hab.*—Attached to filamentous algæ in the brackish water of a salt marsh, Coney Island, N. Y.

The corneous, transparent lorica is exceedingly thin and delicate, vary-

ing much in connection with the surface plications or ridge-like elevations, in early youth the raised lines being low, inconspicuous and irregularly disposed ; in maturity becoming full, rounded and prominent, separated by deep furrows, as if the wall of the lorica had become distended with liquid, dilatation taking place at expansile regions between the ridge-like markings of the earlier stage ; in the mature state the lateral borders are protuberantly crenate.

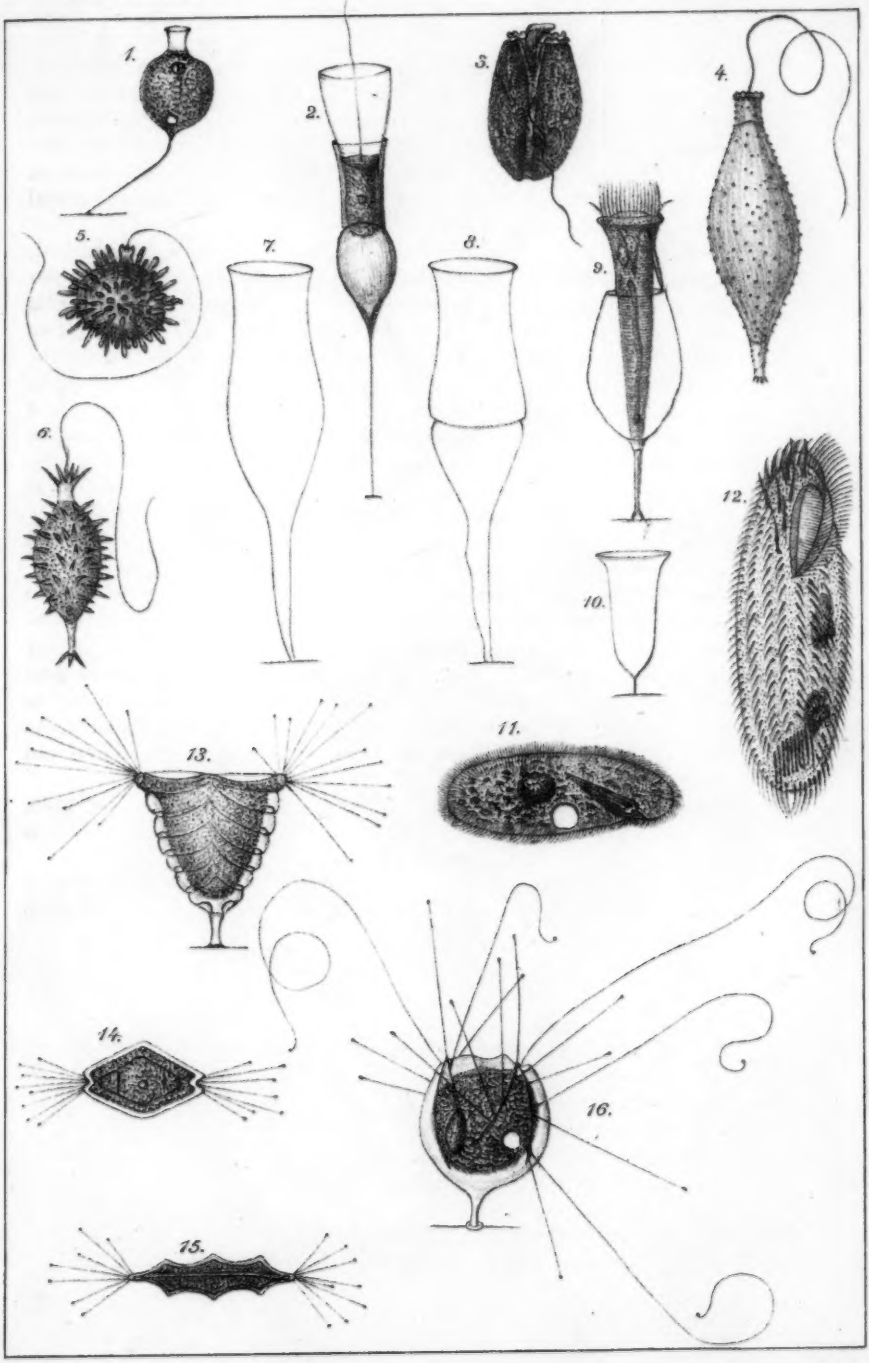
Acineta flexilis, sp. nov. (Fig. 16).—Lorica irregularly subspherical, tapering posteriorly to the short, hollow pedicle ; anterior border closed, thin, apparently perpendicularly lamelliform, the margin irregularly undulate ; two opposite lateral regions each bearing two anteriorly approximating, posteriorly diverging, narrow fissures for the passage of the tentacles, the fissures usually being open only sufficiently for the passage of the tentacles, except during the final development and the escape of the embryo, when those on the lateral margins and that on the frontal border are seen to be continuous, the expanding fissures closing after the escape of the embryo ; pedicle about one-seventh as long as the lorica ; tentacles capitate, of two kinds and apparently issuing only from the slit-like lateral fissures, one kind being straight, rigid, and not often exceeding twice the length of the lorica, the other form filamentous, flexible, writhing and variously curved and coiled, often extending to more than five times the length of the lorica ; body of the animalcule subspherical or obpyriform, not filling the cavity of the lorica, and in no way adherent to it ; endoplasm granular ; nucleus broadly ovate, located near one lateral border ; contractile vesicle single, spherical, postero-lateral in the region opposite the nucleus. Length of the lorica, including the pedicle, $\frac{1}{300}$ inch. *Hab.*—Fresh water from near Trenton, N. J. ; attached to *Spirogyra*.

Codosiga florea Stokes (*Journ. Trenton Nat. Hist. Soc.*, January, 1888, Vol. i, No. 3).—This was incorrectly placed in the genus *Codosiga ;* it is a *Monosiga*, and should be referred to as *Monosiga florea*.

Halsis furcata Stokes (*Journ. Royal Micros. Soc.*, August, 1889).—This generic name being preoccupied, it may, in this instance, be changed to *Halsiopsis*, the single known species then being *Halsiopsis furcata*.

Explanation of the Plate.

Fig. 1. Salpingœca globosa ; with collar retracted.
" 2. Salpingœca collaris.
" 3. Prorocentrum hamatum. × 720.
" 4. Trachelomonas fusiformis. × 500.
" 5. Trachelomonas sphærica. × 460.
" 6. Trachelomonas acanthophora. × 500.
" 7, 8. Vaginicola longipes. × 200.
" 9. Caulicola valvata. × 400.
" 10. Bicosœca phiala ; empty lorica. × 835.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John M. Maisch

Fig. 11. Nassula trichocystis. × 450.
" 12. Urostyla vernalis. × 190.
" 13. Acineta corrugata ; mature, but not old, form. × 400.
" 14. Acineta corrugata ; transverse, subcentral, optical section. × 400.
" 15. Acineta corrugata ; surface view of the frontal region ; somewhat more enlarged than in Figs. 13, 14.
" 16. Acineta flexilis. × 560.

Obituary Notice of John M. Maisch.

By Charles S. Dolley, M.D.

(*Read before the American Philosophical Society, December 7, 1894.*)

The preëminence which American pharmacy has for many years maintained may without doubt be largely attributed to the scientific zeal and ability of the teachers of pharmaceutical science in the various institutions of the country. To no one belongs a greater meed of praise than to the late Prof. Maisch, a member of the American Philosophical Society, to which he was elected January 18, 1884.

John Michael Maisch was born of humble parents in Hanau on the Main, Germany, on the 3d of January, 1831. His early education was obtained at the free schools of his native town, and he soon attracted the special attention of his teachers on account of his aptness and diligence. Under one Theobald, he was introduced to the study of mineralogy and microscopy and began practical field work in the vicinity of Hanau, and it was largely due to the interest awakened by this teacher that he became ambitious for a university education and was led to seek instruction outside that afforded him by the curriculum of his school.

Under Dr. Bromies he soon demonstrated his fitness for original investigation in chemistry, and was permitted by him to assist in certain studies of the fatty acids and resins.

For a time his inclinations were towards theology, but his increasing interest in natural science led him to abandon the idea and to devote himself with such ardor to his scientific studies as to undermine his strength to such an extent that it became necessary not only to give up close application for a time, but, in the end, to relinquish his strong desire for a university course.

Entering the military service of Hesse, he became impregnated with the revolutionary ideas rife among the soldiery, and recognizing the inconsistency of his position, he resigned his post and, joining the Turners of

Hanau, accompanied them in their excursions through the Valley of the Main, assisting them in the promulgation of revolutionary sentiments.

In 1849, while engaged in this work, he was arrested at Sinsheim and sentenced to four and a half years' imprisonment with hard labor; but through the connivance of friends he soon after effected his escape and managed to emigrate to America. Landing almost penniless in Baltimore, young Maisch took up for a time with factory work, but soon managed through his fondness for natural science to make the acquaintance of Drs. Wiss and Vogler, who aided him in the study of pharmacy and gave him employment for a time during the years 1850–51 in a drug store owned by the former. This store being sold, Mr. Maisch removed to Washington, where he served in a drug store until 1853, when his parents and sisters having come to Philadelphia, he joined them there. For about two years he acted as drug clerk in Philadelphia and New York and finally entered a chemical factory in Brooklyn. From 1856 to 1859 he was employed by the firm of E. B. Garrigues and Robert Shoemaker, of Philadelphia, and in the latter year he accepted an instructor's position in the School of Pharmacy conducted by Prof. Parrish in an upper room at the southwest corner of Eighth and Arch streets.

Here his natural love for research, his tact and ability as a teacher attracted attention and led to his call to the Professorship of Pharmacy and Materia Medica in the College of Pharmacy of the City of New York, his spare time being employed in the laboratory of Dr. E. R. Squibb. Prof. Maisch returned to Philadelphia in 1863, when under Surgeon-General Hammond he organized the U. S. Army Laboratory, which, during the two and a half years in which he conducted it, is said to have effected a saving to the Government of nearly a million of dollars. After the War and until 1871 Prof. Maisch carried on a retail drug business at 1607 Ridge avenue, but finally gave it up on account of his increasing duties at the Philadelphia College of Pharmacy and as the Secretary of the American Pharmaceutical Association, of which he had been from 1856 one of the most active members.

It was in 1866 that John Maisch succeeded William Proctor, Jr., in the Chair of Pharmacy, but in the ensuing year he exchanged Chairs with Prof. Parrish, assuming the title of Professor of Materia Medica and Botany. This position Prof. Maisch retained until his death on the 10th of September, 1892. In 1860 he was elected a member of the Board of Trustees of the Philadelphia College of Pharmacy and ten years later accepted the editorship of the *American Journal of Pharmacy*. That John Maisch was a man of unwearied industry, absolute integrity and profound knowledge, is the unanimous testimony of all who were familiar with him and with his teachings and writings, a fact which was emphasized by the conference of the Hanbury Gold Medal upon him by the Pharmaceutical Society of Great Britain for distinguished services and original research in the natural history of drugs. The following is a list of Prof. Maisch's contributions to science :

1854. On the Adulteration of Drugs and Chemical Preparations. Amer. Journ. Pharm.
Liquor Ferri Iodide. *Ibid.*
1855. On the Incompatibility of Sulphate of Quinia with the Acetates. *Ibid.*
Examination of Bitartrate of Potassa. *Ibid.*
Effects of Sunlight on the Syrup of Iodide of Iron. *Ibid.*
Translation of M. Strecker's Paper on Quinine. *Ibid.*
Contributions to Toxicology. *Ibid.*
1856. On Convenient Modes of Administering Cod Liver Oil. *Ibid.*
On the Relations of Physicians and Pharmaceutists. *Ibid.*
Contributions to Toxicology. *Ibid.*
On an Expeditious Mode of Making Mercurial Ointment. *Ibid.*
On Solution of Gutta Percha. *Ibid.*
On Sulphate of Quinine and Carbonate of Ammonia in Pills. *Ibid.*
On Wine of Colchicum Seed. *Ibid.*
1857. On Protiodide of Mercury. *Ibid.*
On Effervescing Powders. *Ibid.*
Solubility of Iodides in Syrupus Ferri Iodidi. *Ibid.*
On Fluid Extract of Arnica. *Ibid.*
On Fluid Extract of *Uva ursi*. *Ibid.*
On the Detection of a New Falsification of Oil of Bitter Almonds. *Ibid.*
American Eclectic Resinoids. Buchner's Repertorium für Pharmacie, Vol. vi, p. 481.
1858. On the Sale of Poisons in the United States. *Ibid.*, Vol. vii, p. 267.
On Fluid Extracts in the United States. *Ibid.*, Vol. vii, p. 297.
Remarks on Some Pharmaceutical Preparations. Amer. Journ. Pharm.
On Diluted Acetic Acid. *Ibid.*
On the Preservation of Drugs from Insects. *Ibid.*
Note on Syrup of Hypophosphites. *Ibid.*
On the Decomposition of the Quinia by the Acetates. *Ibid.*
1859. On Extractum Ferri Pomatum. *Ibid.*
On the Preservation of Fluid Extracts. *Ibid.*
On the New System of German Weights. *Ibid.*
On the Proper Menstruum for Fluid Extracts. *Ibid.*
Notes on Fluid Extracts of Buchu, Cimicifuga, Serpentaria and Valerian. *Ibid.*
On the Solubility of Phosphate of Iron. *Ibid.*
On a New Mode of Preparing Some Syrups. *Ibid.*
Manufacturing Pharmacy in the United States. Buchner's Repertorium, Vol. viii, p. 433.
1860. On Examination of Oil of Peppermint. Amer. Journ. Pharm.
On Some Preparations of Calamus Root. *Ibid.*
Gleanings from the German Journals (three articles). *Ibid.*

1860. Alumen Exsiccatum. *Ibid.*
Analysis of Commercial Glacial Phosphoric Acid. *Ibid.*
Note on Benzoic Acid and Some Benzoates. *Ibid.*
On the Detection of Croton Oil in Mixtures. *Ibid.*
Analysis of Milk. *Ibid.*
Chemical Notes. *Ibid.*
Alumen ustum. Buchner's Repertorium, Vol. ix, p. 127.
United States Pharmacy. *Ibid.*, p. 145.

1861. On *Chelidonium majus*. Amer. Journ. Pharm.
On the Adulteration of Carmine. *Ibid.*
On Commercial Iron by Hydrogen. *Ibid.*
On the Importation of Mineral Waters. *Ibid.*
Analysis of the Chalybeate Waters of Sharon Spring, New York. *Ibid.*
On Anacahinte Wood. *Ibid.*
On the Tincture and Ferrated Tincture of Bark. *Ibid.*
On the Origin of Bay Rum. *Ibid.*
On the Volatile Oil of *Myrcia acris*. *Ibid.*
On the Ferrated Tincture of Cinchona. *Ibid.*
On the Conversion of Monohydrated into Common Phosphoric Acid. *Ibid.*
Gleanings from the German Journals (four articles). *Ibid.*
Chemical Examination of Cocoa Leaves. *Ibid.*
On the Mineral Water Trade in the United States. Buchner's Repertorium, Vol. x, p. 257.
On the Medical Flora of the Vicinity of Philadelphia. *Ibid.*, Vol. x, pp. 289 and 359.

1862. Gleanings from the German Journals. Amer. Journ. Pharm.
On Commercial Belladonna Leaves. *Ibid.*
Report of Committee on Herbarium. *Ibid.*
On the Standing of the Pharmacist in the United States Army. Buchner's Repertorium, Vol. xi, p. 294.
On Snake-bite Remedies in the United States. *Ibid.*, p. 352.

1863. On Copaiba Pills. Amer. Journ. Pharm.
Gleanings from the German Journals. *Ibid.*
Note on the Alkaloids of *Menispernum Canadense*. *Ibid.*
Note on Podophyllum. *Ibid.*

1864. Practical and Scientific Notes. *Ibid.*
On Impurities and Adulterations. *Ibid.*
Gleanings from German Journals. *Ibid.*
On the Contamination of American Sulphuric Acid with Arsenic. *Ibid.*

1865. On the Preparation of Heavy Oil of Wine. *Ibid.*

1866. On the Active Principle of Rhus Toxicodendron. *Ibid.*

1867. On Liquor Magnesiæ Citratis. *Ibid.*
On Liquor Ferri Acetatis. *Ibid.*

1867. On the Specific Gravity of Medicinal Chloroform. *Ibid.*
On Colchicia. *Ibid.*
On Tests for the Purity of Glycerin. *Ibid.*
On Carelessness in the Collection of Drugs. *Ibid.*
Note on Cheap Glycerin. *Ibid.*
Gleanings from the German Journals (two articles). *Ibid.*
On a Permanent Solution of Pyrophosphites of Soda and Iron. *Ibid.*
Review of Pharmacopœia Helvetica. *Ibid.*
1868. Gleanings from the German Journals. *Ibid.*
On Chloroform. *Ibid.*
Note to Editor on False Jalap. *Ibid.*
1869. Gleanings from the German Journals (four articles). *Ibid.*
On the Milky Juice of *Lactuca elongata*. *Ibid.*
On Some Panama Drugs. *Ibid.*
On the Nomenclature and Definitions of the United States Pharmacopœia. *Ibid.*
1870. On *Lycopodium clavatum*. *Ibid.*
On the Weeds of Western Peppermint Plantations. *Ibid.*
Gleanings (three articles). *Ibid.*
On Pharmaceutical Legislation. *Ibid.*
On Solubility of Glue in Glycerin. *Ibid.*
1871. Decomposition of Acetate of Morphia in Aqueous Solution. *Ibid.*
Detection of Turmeric in Powd. Rhubarb and Mustard. *Ibid.*
Ferrated Elixir of Cinchona. *Ibid.*
Gleanings from Foreign Journals. *Ibid.*
Gleanings from German Journals (four articles). *Ibid.*
Fluid Extract of Chestnut Leaves. *Ibid.*
Note on Amylo-nitrous Ether. *Ibid.*
Note on Hydrocyanate of Morphia. *Ibid.*
Note on Some Pill Masses. *Ibid.*
Precipitation of Quinia by Iodide of Potassium. *Ibid.*
Seeds of Two Species of Strychnos. *Ibid.*
Solutions of Alkaloids in Medicated Waters. *Ibid.*
Syrupus Assafœtidæ. *Ibid.*
1872. Gleanings from the European Journals (twelve articles). *Ibid.*
Loss of the Herbaceous Parts of Plants in Drying. *Ibid.*
Monobromated Camphor. *Ibid.*
On an Asserted Specific for Ague. *Ibid.*
On Some Pectoral Powders of European Pharmacy. *Ibid.*
On the Botanical Origin of Root of Cypripedium. *Ibid.*
On the So-called African Saffron. *Ibid.*
Pharmacognostical Notes. *Ibid.*
Use of Petroleum Benzine in Making Oleoresins. *Ibid.*
1873. Chloride of Mercurethyl. *Ibid.*
Impurities Among Rhizomes of Cypripedium. *Ibid.*
Levico Mineral Water. *Ibid.*

1873. Gleanings from European Journals. *Ibid.*
Medicinal Use of Green Soap. *Ibid.*
Remarks on Elixirs. *Ibid.*
Selected Formulas from Pharm. Germ. *Ibid.*
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The Château de Rochambeau.

By Joseph G. Rosengarten.

(*Read before the American Philosophical Society, December 21, 1894.*)

The home of La Fayette at La Grange has long been a point of attraction for many Americans, full of admiration for La Fayette and the part he played in the American Revolution. The story of his services in behalf of the struggling colonies, so well told by Mr. Charlemagne Tower, Jr., in his noteworthy contribution to our history of the Revolution, will undoubtedly strengthen and renew the strong affection always entertained in this country for La Fayette, so markedly exhibited during his lifetime, especially on his last visit to this country, and in the reception given to his descendants, who came here to join in the celebration of the centennial anniversary of the surrender of Cornwallis at Yorktown. In doing honor to La Fayette and to his countrymen for their help in securing American independence, we ought not to forget the Rochambeaus, father and son, the former the General-in-Chief of the French Allied Army sent to help the American colonies in their struggle against Great Britain, the son his Aid de-camp, who served with distinction, and was sent to France to secure that final help, fleet, men and money, with which the long war for Independence was brought to a successful termination by the closing and crowning victory. A recent visit to the Château de Rochambeau showed that it was full of interest for Americans, for there the present owner, the Marquis de Rochambeau, piously preserves the historical relics of the family, and prominent among them are those that marked the Comte de Rochambeau's leading part in the American War of Independence. The Château itself is of great interest. Situated on the banks of the Loire, between Blois and Vendôme, it is easily accessible, and a view of its fine grounds, its curious caves, its lovely outlook over the valley of the Loire, its noble avenue and the beautiful river, is of itself a delight to lovers of the picturesque.

In the Massachusetts Historical Society *Proceedings*, 1882-83, Vol. xx, p. 100, the late Hon. Robert C. Winthrop describes his then recent visit to the Château de Rochambeau, where he found many relics of the old Marquis and Count, as he then was, of Yorktown memory—the sword which he wore in America, his badge as an honorary member of the Cincinnati, his baton as a Marshal of France, with all his orders and decorations, and a portrait of himself, one of a large series of family portraits on the walls. On pedestals in the corners were two beautifully wrought miniature cannon, inscribed as having been presented to the widow of the old Marquis by Louis XVIII, to take the place of the two British cannon which Washington had presented to Rochambeau after the victory at Yorktown, which had been seized and probably recast during the French Revolution. In his bedroom was the original MS. of his *Memoirs* printed in

1809. Between the windows was a large portrait, one of Peale's original portraits of Washington, which had been presented by Washington himself to Rochambeau—a large square or three-quarters portrait, in military costume, with a cannon and other military emblems in the background—in perfect preservation and worthy of being included among the most notable of the numberless portraits of the Father of his Country.

A recent visitor, giving an account of the Château as he saw it in September last, in a letter printed in the Philadelphia *Ledger* of October 31, 1894, speaks of the fine suits of ancestral armor, worn by the Rochambeaus of the sixteenth century, around which are draped the American flags, presented by Gen. Hancock to the present owner, certainly an involuntary tribute by the *preux chevalier* of our own army to the prowess of these knights of old. He also was among those who on behalf of the Government of the United States welcomed the Marquis de Rochambeau as the leader of the French visitors of 1881, descendants of the gallant soldiers who had shared in the honors of the surrender at Yorktown. Thus the connection between the Rochambeau of our own Revolutionary War, and the Rochambeau of to-day, is one of the pleasant ties that keep alive the friendship of the two countries and make the United States and France sister republics. The Comte de Rochambeau left two volumes of *Memoirs*, published in Paris in 1809, edited by Leonce de Lancival, which tell the story of his life. Born at Vendôme July 1, 1725, and dying at the Château de Rochambeau on May 1, 1807, his long life was full of interesting experiences as a soldier, and the short episode of his services as Commander-in-Chief of the French Army sent to help Washington, is of itself enough to make him a man of note for all students of American history. He entered the French Army as Cornet in 1743, in Saint Simon's Regiment of Cavalry, and served with distinction in campaigns in Bohemia, Bavaria and on the Rhine; he was made Colonel in 1767, as a reward for his brilliant services at the siege of Namur, and Brigadier for his action at Minorca, and Major-General for his reorganization of the French Army. He served under Marshals Saxe and Richelieu and d'Estrée and de Broglie, who afterwards sent De Kalb to this country with an offer to become the General-in-Chief of the army in the impending struggle, a curious episode admirably told by Dr. Stille, the President of the Historical Society of Pennsylvania. Rochambeau himself tells us that "after the peace," it must have been about 1769, when he was stationed at Strasburg as Inspector of the French Infantry in Alsace, he advised the Hereditary Prince of Brunswick to go to America, and there play the part of William of Orange in England—make himself sovereign of a superb empire—but the Prince had no idea that the colonies could be united then, or for a long time to come. It was a curious coincidence that he should have served under Marechal de Broglie, who seriously hoped to play a leading part in America, and that Rochambeau himself should have led the French Army which did such signal service in helping America to achieve its independence, while the same Brunswick

Prince sent his soldiers, in the pay of Great Britain, to help prevent the colonies from establishing their independence. Rochambeau was a soldier, and he had no political aims and ambitions either here or at home. After his brilliant career in the French wars on the Continent, he gained fresh honor by his successful reorganization of the French Army in its short experience of peace, and as Governor of the Department of Normandy and Brittany, and as Inspector-General, showed great capacity. In 1778 he organized the force intended for a descent on the English coast, and after twenty years of hard service was made Lieutenant-General. He was appointed to the command of the corps intended to be sent to America, consisting of 4000 men, seven ships, and money and supplies for the struggling colonies—De Ternay was put in command of the naval force. Arrived at Newport, R. I., after a voyage of seventy days, he disembarked with his contingent, fortified his position, and later on met Washington at Hartford, and arranged the plan of the campaign that was to end with such signal honor. He sent his son and Aid-de-camp back to France, to procure additional men, and further needed help, and through the younger Rochambeau's vigorous presentation of the case, France was led to send more ships and more men and more money. Col. de Rochambeau returned in May with the satisfactory news of another fleet under De Grasse and six hundred more soldiers and a million and a half francs in coin. Colonial bills were then selling at forty per cent. discount, and much benefit was derived from a further sum of six million francs, which was put at Washington's disposition. The French War Office advised a movement northward to the Penobscot, Nova Scotia and Halifax, but fortunately and wisely left Rochambeau free to join and act with Washington, and it was he who suggested the movement to and operations in Virginia, and at the same time asked for more ships and men and money from the French forces serving in the West Indies.

The Continental currency was practically repudiated by Congress. On June 18, the French corps started to join Washington's Army on the Hudson, making in all a force of 9000 men, enough to keep Clinton in New York and bring Cornwallis to the coast. De Grasse brought from San Domingo Saint Simon's corps of 3000 men and 1,200,000 francs.

Rochambeau divided the 100,000 Louis d'or in his army chest with Washington. The united army crossed the Hudson at King's Ferry, Washington leaving 3000 men on the left bank to cover West Point, the French taking position on the lower Hudson, as if for an attack on New York, but soon moving to the Delaware, passing it at Trenton, going through Philadelphia, where Congress reviewed it.

The library of the Historical Society has a copy of a rare book, an abridged translation of the *Memoirs of the Marshal Count de Rochambeau*, by M. W. E. Wright, published in Paris in 1838, giving that part of the French original dealing with his American campaigns. The English of this translation and the queer mistakes in names of men and places make this a very curious performance; it does not seem to have invited any

attention to Rochambeau's *Memoirs* or to the broader subject of the French forces in America, since then so fully and ably discussed by the late Mr. Balch in his various elaborate studies of the material he gathered in Paris. In that treasure house of information on the subject, Doniol's *Histoire de la Participation de la France à l'Etablissement des États Unis d'Amerique*, Rochambeau's name and deeds are frequently recorded. Chosen to command a descent on the English coast, for his services in the Seven Years' War had made him preëminent for an independent expedition, he was suddenly called from the Château de Rochambeau, where he had just gone to take possession on the death of his father. He was assigned to the leadership of the force sent to America. He was in consultation with La Fayette as to its details. His instructions are printed in the seventh volume of Sparks' *Washington*, where the letters from Washington to Rochambeau, both in this country and after his return to Europe, show the close ties that bound the two in life-long friendship. La Fayette was full of zeal and ambition, and acting as intermediary between Washington and Rochambeau, was at the outset unwilling to defer to the prudence and experience of the elder soldier, but in the end all worked together harmoniously with the best results. Rochambeau treated La Fayette with fraternal tenderness, and even in criticising his impetuous plans, spoke of himself as "le vieux père qui parle à son cher fils." When Washington and Rochambeau met for the first time at Hartford, the former had Knox and La Fayette with him; the latter Ternay, Chastellux, Fersen, Damas, Mathieu Dumas. The results of the interview were entrusted to the younger Rochambeau, who sailed in a ship commanded by La Perouse, to seek in France additional help, men, money and ships. Chastellux and Mathieu Dumas both printed their accounts of their life in America, the former in 1786, the latter not until 1839, but both show that France and indeed all Europe were closely following events in America. Washington naturally deferred to the older soldier, but Rochambeau loyally sought to do all he could to assist both in perfecting plans for military operations and in making them successful by the prompt use of all the means at hand. The fifth volume of Doniol gives the letters of Rochambeau to the French War Department, from his accepting the command until he returned to France; it includes copies of his correspondence with Washington and with de La Luzerne, the French Minister in Philadelphia. In his letter accepting his appointment, he recalls his experience in the battles of Laufeldt, Crefeld and Closter-camp, and his reasons for a force large enough for all the contingencies of a war in a distant country. Undoubtedly to him is due the fact of later reinforcements of men and ships as well as liberal advances of money. Besides reproducing portraits of Rochambeau from Trumbull, Doniol gives in his fifth volume a portrait owned by the family, from a miniature in their possession. Of the son I know of no portrait in this country, although there is a very good one at the Château de Rochambeau, that might with advantage be reproduced to add to the growing gallery of men of note in our history.

In Scharf and Westcott's *History of Philadelphia*, Vol. i, p. 414, there is a record of the visit on August 30, 1781, of Washington and Rochambeau. They were received by the Light Horse and escorted to the city tavern and thence to the house of Robert Morris, on Market street, between Fifth and Sixth. At three o'clock they proceeded to the State House, and paid their respects to Congress, after which they returned to Mr. Morris', where they dined in company with Samuel Huntingdon, the President of Congress, Gens. Knox, Moultrie and other distinguished officers. In the evening the city was illuminated.

Mr. Westcott, in his *History of Philadelphia*, says that they dined with the President of Congress [of the State ?], Thomas McKean. In the afternoon the vessels in the Delaware displayed their flags and fired salutes. On September 3 and 4, the French Army marched through the city. Their route was down Front and Second street, and past the State House, where Thomas McKean, as President of the United States, being Chief Officer of Congress, dressed in black velvet, and sword by his side, his head covered, reviewed them, receiving the honors due to a sovereign. On his left were Washington and Rochambeau, uncovered, and on his right the Chevalier de la Luzerne, the French Minister. After the ceremonies, President McKean sent a formal letter to Count Rochambeau, expressing the satisfaction of himself and of Congress at the brilliant appearance and exact discipline of the several corps.

The regiment Soissonais was exercised on the commons on September 4, in the presence of Congress, the French Minister and the Generals, and 20,000 spectators. The regiment had four field pieces, and went through all the evolutions of a skirmish, to the delight and satisfaction of the vast crowd. On July 15, 1782, Washington and Rochambeau attended the fête given by the French Minister at his residence in Philadelphia to 1500 guests, in honor of the birthday of the Dauphin of France. His house was near Sixth and Chestnut streets, where in the evening there were fireworks on the large lot on Chestnut street opposite the Minister's residence. Mr. Gérard was elected a member of the Philosophical Society in 1779, following other illustrious Frenchmen on its rolls, Condorcet, Daubenton, Barbeu Dubourg, Le Roux, Reynall, Lavoisier, Rozier, and in turn followed by Luzerne, Marbois, La Fayette, Chastellux, Vergennes, Guichen, Rochefoucauld, Cabanis, Brissot de Warville, Du Pont de Nemours, and all of these have made their mark on both sides the ocean. Thus the Philosophical Society began its admirable method of recognition of those who have rendered great public service both in the old world and in the new.

Washington and La Fayette reached Williamsburg September 14, and found there La Fayette strongly posted. Barras brought the siege guns by water, and then took Viomesnil and his troops from Annapolis to Jamestown, where the whole army was united by September 26. On the 28th the siege of Yorktown was begun, de Grasse landing 600 men from his fleet to assist the land operations. The American Army was on the

right, the French on the centre and left. On October 19, Cornwallis surrendered with 8000 men, 214 guns and 22 flags. On the 27th an English fleet of 27 sail came to Cape Henry, but it was too late. The French took possession of the British quarters at Yorktown, Gloucester, Hampton and Williamsburg. Later they rejoined Washington at King's Ferry on the Hudson. Returning to France, Rochambeau was received with honor by the King, and, with other French officers who had served with him, was meted out decorations and promotions. It was on his return from Yorktown that here in Philadelphia, as he tells us in his *Memoirs*, of all the honors paid him, none touched him more than an address presented to him by a deputation of Quakers, old men in costumes that he characterizes as quaint from their simplicity, who thanked him, not for his military success, of which they told him they had no admiration, but because of his being the friend of mankind, and for the perfect order and discipline of his soldiers, and he records with satisfaction the fact that in the three campaigns he had made in America, there was not a single instance of any quarrel between soldiers of the French Army and those of the American Army, a record honorable alike to the soldiers of both nationalities, officers and enlisted men, too. It is eminently characteristic of the man that in this hour of glory he interceded on behalf of De Grasse and secured for him a return to the King's favor.

Rochambeau in his *Memoirs* gives a glowing account of the resources of the country, and says he thought the United States could some day have a population of thirty millions or more. He made a short visit to England and was received most cordially, meeting many of Cornwallis' officers on a very friendly footing. At the outbreak of the French Revolution he had both civil and military duties forced on him, and was given the command of the Army of the North. He was the last Marshal of France appointed by Louis the XVI, and Napoleon in confirming this distinction put him first on the list of his Marshals. Forced by ill health to give up his command, he retired to his Château, was arrested and sent to prison by Robespierre, and after nine months' confinement, barely escaping the guillotine, was released without trial, and indeed without formal charges of any kind. His son was sent to the West Indies, where he was as successful as possible under the most disadvantageous conditions, but finally was made a prisoner of war by the English. Paroled by them, he paid a visit to Washington, and was received by him with every honor. After eighteen months he was exchanged, and that for Gen. O'Hara, one of the English officers captured at Yorktown. He again returned to France, and was appointed Governor-General of San Domingo. The father congratulated Berthier, who had served under him in America, on his appointment as Napoleon's Chief of Staff, and was presented to Napoleon, who wanted to make him a senator, an honor which he declined on the score of age and bad health, but he was made Grand Officer of the Legion of Honor. The son was sent back to France as a prisoner by his own rebellious subordinates, and the father went to Paris to defend him against charges

made by his enemies, but the son was again a prisoner in England, in spite of the father's appeal to Cornwallis to remember his release on parole at Yorktown. The younger Rochambeau finally returned to France, was made General of Division, and lost his life at the battle of Leipsic, in 1813. The father had died in 1807, and a grandson, a young cavalry officer of great promise, praised by Davoust and promoted to a staff position, lost his leg in the same engagement, and was thus compelled to return to civil life. He lived and died at Rochambeau, and the stately Château is rich in relics of these three generations of gallant soldiers and of many ancestors of distinction in both civil and military life. The present Marquis de Rochambeau, himself no mean scholar in history and archeology, has printed an interesting little volume of sketches written by the younger General de Rochambeau during the last years of the eighteenth century, and when he was a prisoner of war in England between 1803 and 1811; they are drawn from his personal knowledge of the men and events hastily described—Danton, Robespierre, Barrère, Carnot, Brissot, Montesquieu, Custines, Biron, Pichegru, among them not a few who had served with the French Army in the American War of Independence, and some of whom achieved great distinction under Napoleon. It is curious to find that Gen. de Rochambeau suggests that the Duke of Kent be sent to command in Nova Scotia, in the hope that the dissatisfied party in the United States might find in him a possible candidate for President, making the office hereditary. As the elder Rochambeau had suggested to a Brunswick Prince the possibility of founding an empire in America, so the younger Rochambeau believed that the English Government had an idea that Americans still cherished a secret affection for the house of Hanover.

The Marquis de Rochambeau has printed, too, several valuable archeological works and an account of the Château de Rochambeau. He calls attention to the curious rock grottoes on the hillsides around it, the work of more than twenty centuries back, for he traces them to the Celts, and has found evidences of their handiwork, ancient dwelling places of the very earliest dwellers in the region, and their burial places, too, for skeletons of great antiquity, and other evidences of Druidical worship of the third century, have been found there. The estates were in the family from the eleventh to the twelfth century, and the deeds and other muniments of title have been preserved from the fifteenth century, beginning in 1486, although members of the family are known to have taken part in the Crusades, one of them under St. Louis of France falling in battle in Egypt in 1251, while another in return for his services in a campaign in Italy was granted as motto for his shield the device: "*Vivre en preux y mourir.*"

From 1516 the Château and estate of Rochambeau gave the name borne by the family, and among them some were distinguished in the wars of the League, others in the navy, one under Jean Bart was made Commodore in 1741, and another Governor of Vendôme was succeeded in that office

by his son, who commanded the French forces in the American War of Independence, and later on became Marshal of France. The Château itself dates from the twelfth or thirteenth century. It was originally surrounded by walls and flanked with towers. It was rebuilt by Marshal de Rochambeau in the style of his time, and all that recalled the feudal castle disappeared to make room for the architecture of the period. The towers were demolished, but so solid were the foundations that even now when the water of the Loire is clear the old massive stones on which they rested can be seen. Now the Château is a large main central building with two wings. These are comparatively modern, but the main body is of very old construction, with massive walls, secret passages and a hidden entrance to what were once the dungeon keep and underground prisons. In face of the main entrance a graceful modern chapel has been constructed, hollowed out of the soft rock. On one side a great series of stables and other houses, on the other the long line of very ancient caves, still used for farm purposes, in which the archeological zeal and intelligence of the present owner have unearthed many curious relics of its successive occupants, from those of the stone age, through Gallic and Roman days down to historic periods quite within our own memory. Indeed so vast are these artificial caves, that in one of the largest, a whole troop of cavalry were quartered during the recent French military manœuvres at Châteaudun, horses and men numbering nearly a hundred each, being easily accommodated in these roomy, high, airy, dry, well-lighted and well-ventilated natural dwellings. Where once the crenelated walls of the Château commanded the Loire, there are now broad terraces and flights of steps and grassy banks leading to the edge of the river; on either side of the Château fine gardens, and beyond the river broad meadows planted with fine trees in the style of an English park, so much affected in France in the last century, while a splendid avenue of a mile or two leads from the house between the river on one side and the series of rock caves on the other, to the high road leading to Vendôme, all in admirable preservation, and in striking contrast to the flat plain that surrounds the famous Château de Chambord, and the typical straight lines of small trees that are so frequent throughout Touraine, depriving even its historical châteaux of the beauty of the simple Château de Rochambeau. The present Marquis de Rochambeau, in his interesting monograph on the Château and its vicinity, gives a series of early charters, from the seventh to the thirteenth century, for churches and properties now included in its grounds, and the gift of the ground itself under the name of Rochambeau in 1486, the will of the first owner of the present family in 1593, the deed of the establishment of its chapel in 1633, and other interesting papers drawn from the family archives and from local and other public depositories of ancient records. These monographs, that of the younger General de Rochambeau, and that of the present owner of the Château, are in the library of the Historical Society of Pennsylvania, which already has on its shelves the *Memoirs* of the Count de Rochambeau,

the Commander of the French Allied Troops in the War of American Independence, and the archeological writings of the present owner are in the library of the American Philosophical Society. I am very sure that the present owners of the Château will be glad to know that the name of Rochambeau is still borne in honor and affection in this country. The official papers of Rochambeau as Commander of the French Army in this country have very properly been obtained by the Government of the United States, and are now safely deposited in Washington, where no doubt they will be made accessible to students of American history. His private papers are still preserved in the family Château, where he lived and died, and it would be very interesting if his correspondence with those he left there, during his service in this country, could be made public, for we should have from a man of large experience his judgment and opinions of the American patriots and statesmen and soldiers with whom he was in daily communication, and we should know how this old French nobleman and soldier was impressed by the country and the people. His printed *Memoirs* are very favorable in every thing he says of the country and of its people, but they deal in generalities after the fashion of the day. No doubt they give rather his general impressions as he transmitted them by word of mouth to a literary man, who really edited them to suit his own views of how biography ought to be written, than with any fidelity to the plain speech of the old soldier, whose experiences in a long life must have been so wide and so varied. No doubt, too, after the rough usage of the French Revolution, with actual imprisonment and the threat of the guillotine, he looked back on his stay in America, at the head of a well-disciplined and well-equipped force of old soldiers, surrounded by officers who represented the flower of the French aristocracy in its best estate, as a period of great expectations, more than realized by the prosperity of the infant Republic, in great contrast to the violent changes in France, the sad days of the declining monarchy, its violent overthrow, the stormy days of the French Revolution, its excesses, and the strong measures by which Napoleon reëstablished the heavy hand of military power in France and over Europe, and the brilliant years of his empire after its first proclamation. When the elder Rochambeau died, Napoleon was at the very zenith of his power, and when the younger Rochambeau fell at Leipsic, Napoleon's star was still in the ascendant. It would be most gratifying to learn whether their private correspondence and family and other papers are still preserved, and to have them printed, if not in full, at least at sufficient length to give to the growing army of American historical students a better knowledge of the Rochambeaus as they lived and thought, and of their opinions of the men of the new country to whose future greatness they had contributed so largely. That they came of old historic and military stock, tracing its home back to Celtic days, and their family to ancestral Crusaders, made them all the more helpful for the Republic of the New World.

Stated Meeting, November 2, 1894.

President, Mr. FRALEY, in the Chair.

Correspondence was submitted as follows:

A circular from the Executive Committee in honor of Prof. Guido Cora, Turin, Italy, requesting contributions for his twenty-fifth anniversary.

The following societies were reported as having been placed on the list to receive the Society's Proceedings: Societé Française de Physique, Redaction de la Melusine, Paris, France; Società Toscana di Scienze Naturali, Il Nuovo Cimento, Pisa, Italy; American Academy of Medicine, Easton, Pa.; American Archæological and Asiatic Association, Nevada, Ia.; Iowa Masonic Library, Cedar Rapids, Ia.; Field Columbian Museum, Chicago, Ill.; University of Wisconsin, Madison, Wis.; Historical Society of Southern California, Los Angeles, Cal.; California Historical Society, San Francisco, Cal.; Associacion de Ingeneiros y Arquitectos de México, Mexico; Observatorio Meteorológico Central, Xalapa, Mexico.

Accessions to the Library were reported from the Government Geologist, Adelaide, Australia; Congrès Internationaux, Moscow, Russia; Finska Litteratur-Sällskapet, Helsingfors, Finland; R. Societatis Scientiarum, Upsal, Sweden; R. Académie des Sciences, Amsterdam, Netherlands; Mittelschweizerische Geographisch-Kommerzielle Gesellschaft, Aarau, Switzerland; Société Fribourgeoise des Sciences Naturelles, Fribourg, Switzerland; K. K. Militär-Geographisches Institut, Vienna, Austria; Centralbureau der Internationale Erdmessung, K. P. Geodätische Institut, Berlin, Prussia; Naturforschende Gesellschaft, Emden, Prussia; Senckenbergische Naturforschende Gesellschaft, Frankfurt-am-Main, Germany; Naturhistorische Gesellschaft, Nürnberg, Bavaria; Verein für Vaterländische Naturkunde in Würtemberg, Stuttgart; Ministère des Travaux Publics, Paris, France; Cobden Club, London, England; Islenzka Fornleif af jelags, Reykjavik; Agricultural Experiment Station, Burlington, Vt.; Society of Natural History,

Boston, Mass.; N. H. Colony Historical Society, New Haven, Conn.; Society of Natural Sciences, Buffalo, N. Y.; Geological Survey of Pennsylvania, Dr. Bushrod W. James, Messrs. B. S. Lyman, MacCalla & Company, Philadelphia; Commissão Geographica e Geologica, San Paulo, Brazil.

The following decease of members was announced:

Prof. J. A. Froude, London, England, October 20, 1894, æt. 77.

Col. Garrick Mallery, Jr., Washington, D. C., October 25, 1894, æt. 63.

Dr. William Goodell, Philadelphia, October 27, 1894, æt. 65.

On motion the President was authorized to appoint at his leisure a suitable person to prepare the obituary notice of Dr. Goodell.

The consideration of the amendments to the Laws, postponed from the last meeting, came up as the stated business of the Society.

On motion, the consideration of the pending amendments was resumed.

Dr. Greene moved that the further consideration of Articles 1–5 inclusive, Chapter I, be indefinitely postponed, which motion was carried, ayes 16, nays 7.

Sections 6 and 7, Chapter I, were put to a vote and carried as follows:

SECTION 6. Such members as reside within *thirty* miles of the hall of the Society, and such other members as desire to vote at the meetings and elections, shall pay an admission fee of ten dollars, and annually thereafter, on the first Friday of January, a contribution of five dollars. The payment of *one hundred dollars* at one time, by a member not in arrears, shall exempt him from all future annual payments.

SECTION 7. Members-elect, residing within thirty miles of the hall, shall lose the right of membership unless they subscribe the Laws and pay their admission fee within one year after their election. Any member liable to an annual contribution, who shall neglect or refuse to pay the same for the term of two years, shall be notified by the Treasurer in writing, on or before the second Friday in January after such default, that his rights as a member are suspended; and, in case the said arrears, together with the contribution due on the first Friday in January after such notice, shall not be paid to the Treasurer on or before the said last-named day, the membership of such defaulting member shall be forfeited,

his name stricken from the roll, and reported to the Society by the Treasurer.

On motion, Section 5, Chapter II, of the amendments was indefinitely postponed.

The amendments to Chapter VIII as to the Library and the Librarian were referred to the Library Committee.

Chapter IX, Section 3, was amended and carried as follows:

SECTION 3. *Twenty* qualified voters present at any stated or special meeting shall be a quorum, and be competent to elect members, dispose of property, appropriate money, and award premiums; but no property shall be alienated or encumbered, except by the vote of three-fourths of the qualified voters present, and given at two successive stated meetings. For the transaction of the ordinary business, the reception and reference of communications on literary, scientific or other subjects, the members present shall be deemed competent to act, and, in the absence of qualified voters, shall form a quorum.

Chapter VII, Section 7, was amended and carried as follows:

SECTION 7. The President and Senior Secretary of the Society shall be, *ex-officio*, the President and Clerk at their meetings; and *seven* of their number shall be a quorum.

It was ordered that consideration of the above amendments be made the stated business of the ensuing meeting, copies of the amended regulations to be sent to the members with the meeting notices, with notice that the same will then come up for final adoption.

Mr. Benjamin Smith Lyman read a paper on "Some Coal Measure Sections near Peytona, West Virginia."

Prof. Barker presented a paper entitled "The Atomic Mass of Tungsten," by Prof. Edgar F. Smith and E. D. Desi; also one on "The Atomic Mass of Tungsten," by Prof. Edgar F. Smith and Mary E. Pennington.

Dr. Alfred C. Stokes presented (through the Secretaries) a paper entitled, "Notices of Presumably Undescribed Infusoria."

On motion of Dr. Greene, it was

Resolved, A Committee of three be appointed to consider the expediency of providing a light collation after each stated meeting of the Society, or at stated intervals, in the Society's rooms, and that the Committee be

given power to act provided no expense be incurred by the Society by such action.

And the Society was adjourned by the President.

Stated Meeting, November 16, 1894.

President, Mr. FRALEY, in the Chair.

Correspondence was submitted as follows:

An invitation from the Gesellschaft für Anthropologie, Ethnologie und Urgeschichte, Berlin, Prussia, to attend the twenty-fifth anniversary of its foundation, November 17, 1894.

Letters of envoy were received from the Royal Academy of Sciences, Amsterdam, Netherlands; K. Geologische Landesanstalt und Bergakademie, Berlin, Prussia; R. Instituto di Studi Superiori, Firinze, Italia; Muséum d'Histoire Naturelle, Ministère des Travaux Publics, Paris, France; Agricultural Experiment Stations, Burlington, Vt., Amherst, Mass., Buffalo, N. Y., Ithaca, N. Y., College Park, Md., Raleigh, N. C., Knoxville, Tenn., Agricultural College, Miss., Manhattan, Kans., Brookings, S. Dak.

Letters of acknowledgment were received from the Universetets-Bibliotheket, Christiania, Norway (144); R. Norwegian Society of Sciences, Throndhjem (144); K. Zoologisch-Botanisch Genootschap, The Hague, Holland (144); Royal Zoölogical Society (144), Royal Academy of Sciences, Amsterdam, Netherlands (140–142, and Trans., xvii, 3; viii, 1); Musée Teyler, Harlem, Holland (144); Maatschappij van Nederlandsche Letterkunde, Leiden, Holland (144); Anthropologische Gesellschaft (142, 144), K. K. Geologische Reichsanstalt (144), Dr. Aristides Brezina (142, 144), Prof. E. Suess, Vienna, Austria (142, 144); Verein für Geographie u. Statistik, Frankfurt-am-Main, Germany (140–142); Naturwissenschaftliche Verein des Reg. Bez. Frankfurt-an-der-Oder, Prussia

(142, 144); Società Africana d'Italia, Naples, Italy (144); Brown University, Providence, R. I. (144); Oregon Agricultural College, Corvallis (140, 145).

Accessions to the Library were reported from the Physikalisch-Technische Reichsanstalt, Messrs. Friedländer & Sohn, Berlin, Prussia; Schlesische Gesellschaft für vaterländische Cultur, Breslau, Prussia; Vogtländische Alterthumsforschende Verein, Hohenleuben, Saxony; Naturwissenschaftliche Verein, Regensburg, Bavaria; Marquis de Rochambeau, Vendome, France; Meteorological Office, London, England; Dr. Samuel A. Green, Boston, Mass.; Dr. J. C. Morris, Mr. Frederick Prime, Philadelphia; Rev. Prof. Frank P. Manhart, Selinsgrove, Pa.; U. S. Department of Agriculture, Washington, D. C.; Pullman's Palace Car Co, Chicago, Ill.; Lick Observatory, Mt. Hamilton; Prof. Dr. L. Harpérath, Buenos Ayres, S. A.; Agricultural Experiment Stations, Geneva, N. Y.; Charleston, W. Va., Columbus, O.

A cabinet photograph of Mr. W. W. Jefferis was presented by himself.

The President reported that he had appointed Messrs. Greene, Brinton and Phillips as the Committee on Collation after Meeting provided for in the resolution of November 2, 1894.

Owing to the absence of a constitutional quorum, action on the proposed amendments to the Laws was postponed until the next stated meeting of the Society.

Pending nominations Nos. 1273, 1274, 1276–1303 inclusive and new nomination No. 1304 were read.

Specimens of the Anaglyph, the latest discovery of Ducos Du Hauron, the French photo-scientist, were shown by Mr. Julius F. Sachse. The subject was discussed by Dr. J. Cheston Morris, Prof. W. H. Greene, Dr. D. G. Brinton, Dr. George H. Horn and others.

Dr. Brinton moved that the President be authorized and empowered to appoint, at his leisure, a committee of five members to devise and report an improvement in the Laws respecting the election of members.

(The President subsequently appointed Messrs. Brinton, Prime, Morehouse, Greene and Cattell).

Dr. Morris moved to refer the resolution to Council with directions to report upon the same at the next meeting of the Society.

Dr. Morris' motion, being put to a vote, was lost.

The original motion then being put, was carried.

And the Society was adjourned by the President.

Stated Meeting, December 7, 1894.

President, Mr. FRALEY, in the Chair.

Corresondence was submitted as follows:

Letters of envoy were received from the Institut Egyptien, Cairo; Australasian Association for Advancement of Science, Adelaide; Royal Society of New South Wales, Sydney, Australia; Verein für Schlesische Insektenkunde, Schlesische Gesellschaft für Vaterländische Cultur, Breslau, Prussia; Vogtländische Alterthumsforschende Verein, Hohenleuben, Saxony; M. de Nadaillac, Paris, France; Royal Observatory, Greenwich, England; Zoölogical and Statistical Societies, London, England; Dr. Isaac Roberts, Starfield, Crowborough, Sussex, England; Bureau of Statistics of Labor, Boston, Mass.; American Academy of Medicine, Easton, Pa.; Prof. J. P. Lesley, Philadelphia; Committee on Finance, U. S. Senate, U. S. Coast and Geodetic Survey, Washington, D.C.; Agricultural Experiment Stations, Lake City, Fla., New Orleans, La., College Station, Tex.; Fort Collins, Colo., St. Anthony Park, Minn., Tucson, Ariz.; Kansas Academy of Science, Topeka; Direccion General de Estadistica, Mexico, Mexico.

Accessions to the Library were reported from the Australasian Association for the Advancement of Science, Adelaide; Government Museum, Madras, India; K. P. Akademie der

Wissenschaften, Berlin, Prussia; Nassauische Verein für Naturkunde, Wiesbaden, Prussia; Biblioteca N. C. di Firenze, Italia; Marquis de Nadaillac, M. Levasseur, Paris, France; Meteorological Office, London, England; Dr. Isaac Roberts, Starfield, Crowborough, Sussex, England; Royal Observatory, Cape of Good Hope, Africa; H. G. Pearson Memorial Committee, New York; American Academy of Medicine, Easton, Pa.; Miss Elizabeth Harvey Morison, Philadelphia; Committee on Finance, Washington, D. C.; Public Library, Cincinnati, O.; Director of the Field Columbian Museum, Chicago, Ill.; Direccion General de Estadistica, Mexico, Mexico; Agricultural Experiment Stations, New Haven, Conn., Byran, Tex., Auburn, Ala.

Mr. Charles A. Rutter presented to the Cabinet, through Dr. J. C. Morris, photographs of the Mexican Sacrificial Stone and Mexican Calendar Stone.

Dr. Charles S. Dolley read an obituary notice of the late John M. Maisch.

The following deaths were announced:

Rev. James McCosh (Princeton, N. J.), November 16, 1894, æt. 83.

Hon. Robert C. Winthrop (Boston, Mass.), November 16, 1894, æt. 85.

The following amendments to the Laws laid over from the last meeting were considered and being put to a vote were carried unanimously, a constitutional quorum being present and voting.

Sections 9 and 10, Chapter I, were put to a vote and carried as follows:

"SECTION 9. Such members as reside within *thirty* miles of the hall of the Society, and such other members as desire to vote at the meetings and elections, shall pay an admission fee of ten dollars, and annually thereafter, on the first Friday of January, a contribution of five dollars. The payment of *one hundred dollars* at one time, by a member not in arrears, shall exempt him from all future annual payments.

"SECTION 10. Members-elect residing within thirty miles of the hall shall lose the right of membership unless they subscribe the Laws and pay their admission fee within one year after their election. Any member liable to an annual contribution, who shall neglect or refuse to pay the same for the term of two years, shall be notified by the Treasurer in

writing, on or before the second Friday in January after such default, that his rights as a member are suspended; and, in case the said arrears, together with the contribution due on the first Friday in January after such notice, shall not be paid to the Treasurer on or before the said last-named day, the membership of such defaulting member shall be forfeited, his name stricken from the roll, and reported to the Society by the Treasurer."

Chapter IX, Section 3, was amended and carried as follows:

"SECTION 3. *Twenty* qualified voters present at any stated or special meeting shall be a quorum, and be competent to elect members, dispose of property, appropriate money, and award premiums; but no property shall be alienated or encumbered, except by the vote of three-fourths of the qualified voters present, and given at two successive stated meetings. For the transaction of the ordinary business, the reception and reference of communications on literary, scientific or other subjects, the members present shall be deemed competent to act, and, in the absence of qualified voters, shall form a quorum."

Chapter VII, Section 7, was amended and carried as follows:

"SECTION 7. The President and Senior Secretary of the Society shall be, *ex-officio*, the President and Clerk at their meetings; and *seven* of their number shall be a quorum."

On motion the Committee was discharged.

The following report was presented from the Committee appointed November 16, 1894, to report a new method of electing members:

The Committee appointed by resolution of the Society dated November 16, to report desirable alterations in the By-Laws touching the election of members, recommend as follows:

That Sections 2, 3 and 4 of Chapter I of the Laws of the Society be repealed, and that in their place the following laws be substituted:

"2. A Standing Committee on Resident Membership shall be elected by the Society, on the third Friday in January, to consist of six members, the term of office of two of whom shall expire each year, and none of whom shall be eligible for immediate reëlection; the function of which Committee shall be to examine carefully the claims of each candidate offered for membership, and to which Committee all nominations for membership shall be sent, signed by at least three members of the Society, none of whom shall be members of the Committee on Nominations.

"3. That at the meeting of the Society previous to that assigned for the election of members, the Committee on Nominations shall report to the Society on all nominations which were received by it previous to its last meeting, reporting which candidates received an affirmative vote of at least four out of the six members of the Committee, and which candidates received less than that number; and this report shall be printed and sent,

under seal, to each resident member of the Society, at least one week before the evening of the election; provided, however, that said Committee, before reporting to the Society the names of any candidates who have received less than four affirmative votes, shall notify the proposers of such candidates, in order that their names may be withdrawn, if their proposers so desire.

"4. Nominations for non-resident membership shall be signed by at least three members of the Society who are not of Council, and sent in to the Board of Officers and Council, who shall recommend for election such as they deem desirable, and the election of such shall be in the same manner and at the same time as above specified for resident members."

And to add to Section 6, of Chapter I, these words:

"And any candidate shall be deemed duly chosen who shall have received in his favor a majority of the votes cast."

D. G. Brinton, *Chairman*,
Frederick Prime,
George R. Morehouse,
W. C. Cattell,
William H. Greene.

The same was ordered to be made the special order of business for the next meeting, notice thereof to be sent to the members.

The Committee on Dr. Cope's Paper reported favorably on its publication and was discharged.

The Committee on Collation reported, and was indefinitely continued.

Pending nominations Nos. 1273, 1274, 1276–1303 (inclusive) were read, new nomination 1304 was read, and the Society was adjourned by the President.

Stated Meeting, December 21, 1894.

President, Mr. Fraley, in the Chair.

Correspondence was submitted as follows:

A circular letter was received from the R. Accademia di Scienze Lettere ad Arti, Modena, Italy, announcing the prizes which have been awarded during 1893–94. Also one from

the same Society announcing the death of its Secretary, Cav. Avv. Pietro Bortolotti.

Letters of acknowledgment were received from the Royal Society of Northern Antiquities, Copenhagen, Denmark (144); Colonial Museum, Haarlem, Holland (144); Friesch Genootschap, Leeuwarden, Netherlands (144); Drs. Friedrich S. Krauss (142, 144), Friedrich Müller, Vienna, Austria (142, 144, 145); Naturforschende Gesellschaft des Osterlandes, Altenburg, Germany (142, 144); Naturforschende Gesellschaft, Bamberg, Bavaria (142, 144); K. Bibliothek (144), Redaction der *Naturwissenschaftliche Wochenschrift*, Berlin, Prussia (142, 144); Naturwissenschaftliche Verein, Bremen, Germany (145); K. Leopoldina Carolina Academie der Deutschen Naturforscher, Halle a. S., Prussia (144); Dr. Henri de Saussure, Geneva, Switzerland (144); R. Accademia dei Lincei, R. Comitato Geologico d'Italia, Rome, Italy (144); Société Linnéenne, Bordeaux, France (144); Faculté des Sciences, Marseilles, France (145); Bureau des Longitudes (142), Rédaction *Cosmos* (145), Mr. A. Des Cloizeaux (144), Profs. A. Daubree (144), E. Mascart (145), Marquis de Nadaillac, Paris, France (145); Mr. Samuel Timmins, Arley, Coventry, Eng. (145); University Library, Cambridge, Eng. (145); Royal Society, British Association, Zoölogical Society, R. Meteorological Society, R. Institution of Great Britain, R. Astronomical Society, R. Statistical Society, Linnean Society, Victoria Institute, Mr. Archibald Geikie, London, Eng. (145); Dr. Isaac Roberts, Starfield, Crowborough, Sussex, Eng. (145); Royal Society of Edinburgh, Prof. James Geikie, Edinburgh, Scotland (145); Lord Kelvin, Glasgow, Scotland (145); Royal Dublin Society, Dublin, Ireland (145); Nova Scotian Institute of Science, Halifax (138); American Antiquarian Society, Worcester, Mass. (145); Brown University, Providence, R. I. (144); Society Natural Sciences, Buffalo, N. Y. (144); Geological Society of America, Rochester, N. Y. (135, 140); Messrs. Robert P. Field, William W. Jefferis, Philadelphia (145); Mr. E. T. im Thurn, Georgetown, British Guiana (142, 144).

Accessions to the Library were reported from the R. Ministero della Instruzione Publica, Padova, Italia; R. Accademia di Scienze, Lettere ed Arti, Modena, Italy; Società Reale, Naples, Italy; R. Istituto Veneto di Scienze Lettere ed Arti, Venice, Italy; Marquis de Nadaillac, Paris, France; Yorkshire Geological and Polytechnic Society, Halifax, Eng.; Victoria Institute, London, Eng.; Radcliffe Observatory, Oxford, Eng.; John Hopkins University, Baltimore, Md.; Bureau of Ethnology, United States Geological Survey of the Rocky Mountain Region, Washington, D. C.; Secretaria di Fomento, Mexico, Mexico.

The following death was announced:

Prof. Paul Albrecht, Hamburg, Germany.

Mr. Rosengarten read a paper entitled "The Château de Rochambeau."

Publication Committee reported that it had ordered the publication of Dr. Cope's paper for the *Transactions*.

Pending nominations Nos. 1273, 1274, 1276–1303 (inclusive), and new nomination No. 1304 were read.

Owing to the absence of the quorum required by the Laws of the Society, the report of the Finance Committee was not acted upon, the appropriations were not passed, and candidates for membership were not balloted for.

And the Society was adjourned by the President.

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LIST OF SURVIVING MEMBERS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY,

HELD AT PHILADELPHIA

FOR

PROMOTING USEFUL KNOWLEDGE.

Corrected to January 4, 1895,

BY

HENRY PHILLIPS, JR.,

A Secretary of the Society.

List of surviving Members of the American Philosophical Society, held at Philadelphia for Promoting Useful Knowledge.

The addresses here given so far as known are at the present time. Corrections of this list are respectfully solicited.

A name printed in *italics* indicates that the Society is uncertain as to whether such member is still living and desires information on the subject.

The Society will be happy to receive *photographs* (cabinet size preferred) of such of its members as have not already sent.

A

	Name.	*Date of Election.*	*Present Address.*
1687.	ABBÉ, CLEVELAND.	July 21, 1871,	Army Weather Bureau, Washington, D. C.
2170.	ABBOTT, CHARLES C.	Dec. 20, 1889,	Bristol, Pa.
1463.	ABBOT, HENRY L.	April 18, 1862,	New York city, N. Y.
1809.	ÅCKERMAN, RICHARD	July 21, 1876,	Stockholm, Sweden.
1713.	ACLAND, HENRY W.	Jan'y 17, 1873,	Oxford, England.
2128.	ADAM, LUCIEN.	Dec. 17, 1886,	Rennes, France.
2081.	ADAMS, H. B.	May 21, 1886,	Baltimore, Md.
1381.	*Adamson, Rev. John C.*	July 13, 1856.	
1779.	AGASSIZ, ALEXANDER	April 16, 1875,	Cambridge, Mass.
1642.	AGASSIZ, ELIZABETH.	Oct. 15, 1869,	" "
1860.	ALISON, ROBERT H.	May 3, 1878,	Ardmore, Pa.
1869.	ALLEN, JOEL ASAPH	Sept. 20, 1878,	New York, N. Y.
1927.	AMES, CHARLES G.	Jan'y 21, 1881,	Boston, Mass.
2064.	ANDERSON, GEORGE B.	Feb'y 19, 1886,	West Point, N. Y.
2164.	ANGELL, JAMES B.	Oct. 18, 1889,	Ann Arbor, Mich.
1122.	*Angelis, Pedro de.*	Jan'y 17, 1840,	*Buenos Ayres, S. A.*
2224.	APPLETON, WILLIAM HYDE	May 19, 1893,	Swarthmore, Pa.
2102.	ARGYLL, DUKE OF.	May 21, 1886,	London, England.
1761.	ARMSTRONG, WM. GEORGE . . .	July 17, 1874,	Newcastle-on-Tyne, England.
1996.	ASHHURST, JOHN.	Jan'y 18, 1884,	Philadelphia.
2012.	ASHHURST, RICHARD L.	April 18, 1884,	"

B

	Name.	*Date of Election.*	*Present Address.*
1995.	BACHE, R. MEADE	Jan'y 18, 1884,	Philadelphia.
1832.	BACHE, THOMAS HEWSON	Feb'y 2, 1877,	"
1630.	BAIRD, HENRY CAREY	Jan'y 15, 1869,	"
1991.	BAIRD, HENRY M.	Jan'y 18, 1884,	Yonkers, N. Y.
2075.	BAKER, WILLIAM S.	May 21, 1886,	Philadelphia.
2191.	BALL, ROBERT S.	May 15, 1891,	Dublin, Ireland.
1936.	BARBER, EDWIN ATLEE	April 15, 1881,	West Chester, Pa.
1818.	BARCENA, MARIANO	Feb'y 2, 1877,	Mexico.
1741.	BARKER, GEORGE F.	April 18, 1873,	Philadelphia.
2011.	BARKER, WHARTON	April 18, 1884,	"
1902.	BARTHOLOW, ROBERTS	April 16, 1880,	"
1133.	BARTLETT, W. H. C.	April 17, 1840,	Yonkers, N. Y.
2119.	BASTIAN, ADOLPH	Dec. 17, 1886,	Berlin, Germany.
1968.	BELL, ALEXANDER GRAHAM	July 21, 1882,	Washington.
1966.	BELL, JOSEPH SNOWDEN	July 21, 1882,	Philadelphia.
1802.	BELL, LOWTHIAN	April 21, 1876,	Northallerton, England.
2228.	BESSEMER, SIR HENRY	Feb'y 16, 1894,	Surrey, England.
2149.	BIDDLE, ALEXANDER	Feb'y 17, 1888,	Philadelphia.
2154.	BIDDLE, ARTHUR	Dec. 21, 1888,	"
1920.	BIDDLE, CADWALADER	Oct. 15, 1880,	"
1831.	BIDDLE, CRAIG	Feb'y 2, 1877,	"
2134.	BILLINGS, JOHN S.	Feb'y 18, 1887,	Washington, D. C.
2157.	BLAIR, ANDREW A.	May 17, 1889,	Philadelphia.
1554.	BLAIR, THOMAS S	Jan'y 19, 1866,	Tyrone, Pa.
1669.	BLAKE, WILLIAM PHIPPS	Oct. 21, 1870,	New Haven, Conn.
1790.	BLASIUS, WILLIAM	Oct. 15, 1875,	Philadelphia.
1700.	BLODGET, LORIN	April 19, 1872,	"
1444.	BÖHTLINGK, OTTO	Jan'y 17, 1862,	Leipzig, Germany.
2047.	BONWILL, W. G. A.	Oct. 16, 1885,	Philadelphia.
1126.	BOYÉ, MARTIN H.	Jan'y 17, 1840,	Coopersburg, Pa.
1826.	BRACKETT, CYRUS FOGG	Feb'y 2, 1877,	Princeton, N. J.
2083.	BRANNER, JOHN C.	May 21, 1886,	Stanford University, Cal.
2195.	BREZINA, ARISTIDES	May 21, 1886,	Vienna, Austria.
1636.	BRINTON, DANIEL G.	April 16, 1869,	Philadelphia.
2069.	BRINTON, JOHN H.	Feb'y 19, 1886,	"
1745.	BRITTON, J. BLODGETT	Oct. 17, 1873,	"
2080.	BROOKS, WILLIAM KEITH	May 21, 1886,	Baltimore, Md.
1881.	BROWN, ARTHUR ERWIN	April 18, 1879,	Philadelphia.
1547.	BRUSH, GEORGE J.	Jan'y 20, 1865,	New Haven, Conn.
1653.	BULLOCK, CHARLES	Oct. 15, 1869,	Philadelphia.
1452.	BUNSEN, ROBERT W.	Jan'y 17, 1862,	Heidelberg, Germany.
2007.	BURK, JESSE Y.	Jan'y 18, 1884,	"
1938.	BUTLER, WILLIAM	April 15, 1881,	West Chester, Pa.

C

1788.	CAMPBELL, JOHN LYLE	July 16, 1875,	Crawfordsville, Ind.
1606.	CANBY, WILLIAM MARRIATT	Oct. 16, 1868,	Wilmington, Del.
2051.	CANNIZZARO, TOMMASO	Oct. 16, 1885,	Messina, Italy.
1731.	CAPELLINI, GIOVANNI	April 18, 1873,	Bologna, Italy.
1796.	CARLL, J. F.	Oct. 15, 1875,	Pleasantville, Pa.
2130.	CARRILLO, CRESCENCIO	Dec. 17, 1886,	Merida, Yucatan.
1911.	CARSON, HAMPTON L.	April 16, 1880,	Philadelphia.
1707.	CASSATT, ALEXANDER JOHNSON	Oct. 18, 1872,	"
2147.	CASTNER, SAMUEL, JR.	Dec. 16, 1887,	"

	Name.	*Date of Election.*	*Present Address.*
2152.	CATTELL, J. MCKEEN	May 18, 1888,	Garrison-on-Hudson, N. Y.
1675.	CATTELL, WILLIAM C.	Jan'y 20, 1871,	Philadelphia.
1908.	CHANCE, HENRY MARTYN	April 16, 1880,	"
1783.	CHANDLER, C. F	April 16, 1875,	New York, N. Y.
1778.	CHAPMAN, HENRY C.	April 16, 1875,	Philadelphia.
2132.	CHARENCEY, COMTE HYACINTH DE	Dec. 17, 1886,	Paris, France.
2158.	CLARK, CLARENCE H.	May 17, 1889,	Philadelphia.
1717.	CLARKE, THOMAS C.	Jan'y 17, 1873,	New York, N. Y.
1983.	CLAYPOLE, E. W.	Jan'y 19, 1883,	Akron, Ohio.
1876.	CLOISEAUX, DES, A.	Oct. 18, 1879,	Paris, France.
1999.	COHEN, J. SOLIS	Jan'y 18, 1884,	Philadelphia.
1555.	COPE, EDWARD D.	Jan'y 19, 1866,	"
1367.	COPPÈE, HENRY	Jan'y 18, 1856,	Bethlehem, Pa.
2129.	CORA, GUIDO	Dec. 17, 1886,	Turin, Italy.
1867.	COUES, ELLIOTT	Sept. 20, 1878,	Washington, D. C.
1662.	COX, J. D.	April 15, 1870,	Cincinnati, O.
1672.	COXE, ECKLEY B.	Oct. 21, 1870,	Drifton, Pa.
2207.	CRAMP, CHARLES H	Dec. 16, 1892,	Philadelphia.
1836.	CRANE, THOMAS F.	Feb'y 2, 1877,	Ithaca, N. Y.
2100.	CROOKES, WILLIAM	May 21, 1886,	London, England.
2172.	CRUZ, FERNANDO (of Guatemala)	Dec. 20, 1889.	
1439.	CURWEN, JOHN	April 18, 1861,	Warren, Pa.

D

1567.	DA COSTA, J. M.	Oct. 19, 1866,	Philadelphia.
2214.	DALY, CHARLES P.	May 19, 1893,	New York, N. Y.
1354.	DANA, JAMES D	July 21, 1854,	New Haven, Conn.
1806.	DANNEFELD, C. JUHLIN	April 21, 1876,	Stockholm, Sweden.
1516.	DAUBRÉE, A.	July 17, 1863,	Paris, France.
1811.	DAVENPORT, SAMUEL	Oct. 20, 1876,	Adelaide, S. Australia.
1557.	DAVIDSON, GEORGE	Jan'y 19, 1866,	San Francisco, Cal.
1923.	DAWKINS, WILLIAM B	Oct. 15, 1880,	Manchester, England.
1468.	DAWSON, JOHN W	April 18, 1862,	Montreal, Canada.
2131.	DELGADO, JUAN DE DIAS DE LA RADA Y.	Dec. 17, 1886,	Madrid, Spain.
2208.	DERCUM, FRANCIS X.	Dec. 16, 1892,	Philadelphia.
2013.	DICKSON, SAMUEL	April 18, 1884,	"
2208.	DIXON, SAMUEL G.	Dec. 16, 1892,	"
2108.	DOLLEY, CHARLES S.	Dec. 17, 1886,	"
2089.	DONNER, OTTO.	May 21, 1886,	Helsingfors, Finland.
1946.	DOOLITTLE, C. L.	Oct. 21, 1881,	Bethlehem, Pa.
1839.	DOUGLASS, JAMES, JR.	April 20, 1877,	Spuytenduyvil, N. Y.
1924.	DRAPER, DANIEL	Oct. 15, 1880,	New York, N. Y.
1787.	DROWN, THOMAS M	July 16, 1875,	Boston, Mass.
1918.	DU BOIS, PATTERSON	Oct. 15, 1880,	Philadelphia.
1878.	DUDLEY, CHARLES BENJAMIN	Jan'y 17, 1879,	Altoona, Pa.
2063.	DUNCAN, LOUIS	Feb'y 19, 1886,	U. S. Navy.
1573.	DUNNING, GEORGE F.	Jan'y 18, 1867,	Farmington, Conn.
1727.	DUPONT, EDOUARD	April 18, 1873,	Brussels, Belgium.
2227.	DUPONT, HENRY A.	Feb'y 16, 1894,	Winterthur, Del.
2086.	DURUY, VICTOR	May 21, 1886,	Paris, France.
1679.	DUTTON, CLARENCE E	Jan'y 20, 1871,	Washington, D. C.

E

2105.	EASTON, MORTON W.	Dec. 17, 1886,	Philadelphia.
1917.	ECKFELDT, JACOB B	Oct. 15, 1880,	"

	Name.	*Date of Election.*	*Present Address.*
1825.	EDDY, HENRY T.	Feb'y 2, 1877,	Terre Haute, Ind.
1686.	ELIOT, CHARLES W.	April 21, 1871,	Cambridge, Mass.
1981.	EMMONS, S. F.	Jan'y 19, 1883,	Washington, D. C.
1943.	EVANS, JOHN	Oct. 21, 1881,	Hemel Hempstead, Eng.

F

2180.	FIELD, ROBERT PATTERSON . . .	May 16, 1890,	Philadelphia.
1901.	FLINT, AUSTIN, JR	April 16, 1880,	New York, N. Y.
1621.	FLOWER, WM. HENRY.	Jan'y 15, 1869,	London, England.
1875.	FOGGO, EDWARD A.	Oct. 18, 1879,	Philadelphia.
2197.	FORBES, GEORGE	Oct. 16, 1891,	London, England.
1170.	FRALEY, FREDERICK	July 15, 1842,	Philadelphia.
1912.	FRALEY, JOSEPH C.	April 16, 1880,	"
1695.	FRAZER, PERSIFOR	Jan'y 19, 1872,	"
2171.	FRIEBIS, GEORGE	Dec. 20, 1889,	"
2179.	FULLERTON, GEORGE S.	May 16, 1890,	"
1739.	FULTON, JOHN.	April 18, 1873,	Johnstown, Pa.
1914.	FURNESS, HORACE HOWARD . . .	April 16, 1880,	Philadelphia.
1130.	FURNESS, WILLIAM H.	April 17, 1840,	"

G

1988.	GARRETT, PHILIP C	April 20, 1883,	Philadelphia.
2079.	GATES, M. E	May 21, 1886,	Amherst, Mass.
1025.	GATSCHET, ALBERT S.	Oct. 17, 1884,	Washington, D. C.
1897.	GEIKIE, ARCHIBALD	Jan'y 16, 1880,	London, England.
1803.	GEIKIE, JAMES.	April 21, 1876,	Edinburgh, Scotland.
2067.	GENTH, F. A., JR.	Feb'y 19, 1886,	Philadelphia, Pa.
1355.	GIBBS, OLIVER WOLCOTT. . . .	July 21, 1854,	Cambridge, Mass.
1587.	GILL, THEODORE NICHOLAS . .	July 19, 1867,	Washington, D. C.
1800.	GILMAN, DANIEL C.	April 21, 1876,	Baltimore, Md.
1940.	*Giraldes, J. P. C. Cassado de.* . .	July 20, 1827.	
1950.	GLADSTONE, WM. EWART	Oct. 21, 1881,	London, England.
2212.	GOODALE, GEORGE LINCOLN . . .	Feb. 17, 1893,	Cambridge, Mass.
2162.	GOODE, G. BROWN	Oct. 18, 1889,	Washington, D. C.
1680.	GOODFELLOW, EDWARD.	Jan'y 20, 1871,	"
2203.	GOODWIN, HAROLD	May 20, 1892,	Philadelphia.
1271.	GOULD, BEN. APTHORP	Jan'y 17, 1851,	Cambridge, Mass.
1851.	GRAY, ELISHA.	Jan'y 18, 1878,	Chicago, Ill.
2222.	GREEN, SAMUEL A.	Oct. 20, 1893,	Boston, Mass.
1605.	GREEN, TRAILL	Oct. 16, 1868,	Easton, Pa.
1504.	GREEN, WILLIAM HENRY	April 17, 1863,	Princeton, N. J.
1880.	GREENE, WILLIAM H.	April 18, 1879,	Philadelphia.
2155.	GREGORIO, IL MARCHESE ANTONIO DE	Dec. 21, 1888,	Palermo, Sicily.
2159.	GREGORY, HENRY D.	May 17, 1889,	Philadelphia.
2188.	GREGORY, CASPAR RÉNÉ.	May 15, 1891,	Leipzig.
1229.	*Grimaldi, Ceva*	Oct. 16, 1846,	*Naples, Italy.*
1939.	GRISCOM, WM. WOODNUTT	April 15, 1881,	Haverford, Pa.
1815.	GROTE, AUGUSTUS RADCLIFFE . .	Oct. 20, 1876.	
2090.	GUBERNATIS, ANGELO DE	May 21, 1886,	Florence, Italy.
1438.	GUYANGOS, PASCUAL DE.	April 19, 1861,	London, England.

H

2054.	HAECKEL, ERNEST.	Oct. 16, 1885,	Jena, Prussia.
1658.	HALE, EDW. EVERETT	Jan'y 21, 1870,	Roxbury, Mass.
1709.	HALE, HORATIO	Oct. 18, 1872,	Clinton, Canada.

	Name.	*Date of Election.*	*Present Address.*
1853.	HALL, ASAPH	Jan'y 18, 1878,	Washington, D. C.
1795.	HALL, CHARLES EDWARD	Oct. 15, 1875,	Westport, N. Y.
2219.	HALL, ISAAC H	May 19, 1893,	New York, N. Y.
1356.	HALL, JAMES	July 21, 1854,	Albany, N. Y.
2027.	HALL, LYMAN B	Jan'y 16, 1885,	Haverford, Pa.
1412.	HAMMOND, WILLIAM A	Oct. 21, 1859,	New York, N. Y.
2194.	HAMY, E. T	May 15, 1891,	Paris, France.
1337.	HARDING, GEORGE	Jan'y 20, 1894,	Philadelphia.
2136.	HARRIS, JOSEPH S	May 20, 1887,	"
1827.	HART, JAMES MORGAN	Feb'y 2, 1877,	Ithaca, N. Y.
1510.	HARTSHORNE, HENRY	July 17, 1863,	Philadelphia.
1764.	HAUER, FRANZ RITTER VON	Oct. 16, 1874,	Vienna, Austria.
1681.	HAUPT, HERMANN	April 21, 1871,	St. Paul, Minn.
1862.	HAUPT, LEWIS M	May 3, 1878,	Philadelphia.
2082.	HAYES, R. SOMERS	May 21, 1886,	New York, N.Y.
2071.	HAYS, J. MINIS	Feb'y 19, 1886,	Philadelphia.
2165.	HAZLEHURST, HENRY	Oct. 18, 1889,	"
1985.	HEILPRIN, ANGELO	April 20, 1883,	"
2218.	HEWETT, WATERMAN T	May 19, 1893,	Ithaca, N. Y.
1963.	HILL, HAMILTON ANDREWS	April 21, 1882,	Boston, Mass.
2110.	HILPRECHT, HERMANN V	Dec. 17, 1886,	Philadelphia.
1768.	HIMES, CHARLES FRANCIS	Oct. 16, 1874,	Carlisle, Pa.
1663.	HITCHCOCK, CHARLES HENRY	April 15, 1870,	Hanover, N. H.
2160.	HOFFMAN, WALTER J	Oct. 18, 1889,	Washington, D. C.
2068.	HOLLAND, JAMES W	Feb'y 19, 1886,	Philadelphia.
1624.	HOOKER, JOSEPH D	Jan'y 15, 1869,	London, England.
2224.	HOPPIN, J. M	Oct. 20, 1893,	New Haven, Conn.
1607.	HORN, GEORGE HENRY	Oct. 16, 1868,	Philadelphia.
2070.	HORNER, INMAN	Feb'y 19, 1886,	"
1941.	HOTCHKISS, JEDEDIAH	Oct. 21, 1881,	Staunton, Va.
1696.	HOUGH, GEORGE W	Jan'y 19, 1872,	Evanston, Ill.
1698.	HOUSTON, EDWIN J	Jan'y 19, 1872,	Philadelphia.
2143.	HOUSTON, HENRY H	May 20, 1887,	"
2084.	HOVELACQUE, ABEL	May 21, 1886,	Paris, France.
1843.	HUMPHREY, H. C	July 20, 1877.	
2211.	HUMPHREY, JAMES ELLIS	Dec. 16, 1892,	Baltimore, Md.
1623.	HUXLEY, THOMAS HENRY	Jan'y 15, 1869,	London, England.
1426.	HYRTL, JOSEPH	July 20, 1860,	Vienna, Austria.

I

2052.	IM THURN, EVERARD F	Oct. 16, 1885,	Georgetown, British Guiana.
2221.	D'INVILLIERS, EDWARD VINCENT	May 19, 1893,	Philadelphia.
1773.	INGHAM, WM. ARMSTRONG	April 16, 1875,	"

J

2010.	JAMES, EDMUND J	April 18, 1884,	Philadelphia.
1933.	JANNET, CLAUDIO	April 15, 1881,	Paris, France.
2049.	JAYNE, HORACE	Oct. 16, 1885,	Philadelphia.
1954.	JEFFERIS, WILLIAM W	Jan'y 20, 1882,	"
2017.	JORDAN, FRANCIS, JR	April 18, 1884,	"

K

1989.	KANE, ELISHA KENT	April 20, 1883,	Kane, Pa.
2169.	KEANE, JOHN J	Dec. 20, 1889,	Washington, D. C.
2021.	KEEN, WILLIAM W	July 18, 1884,	Philadelphia.

	Name.	*Date of Election.*	*Present Address.*
1723.	KELVIN, LORD (WM. THOMSON). .	April 18, 1873,	London, England.
2118.	KIEPERT, HENRI.	Dec. 17, 1886,	Berlin, Prussia.
1161.	KENDALL, E. OTIS	Jan'y 21, 1842,	Philadelphia.
1708.	KING, CLARENCE	Oct. 18, 1872,	New York, N. Y.
1284.	KIRKWOOD, DANIEL	April 18, 1851,	Riverside, Cal.
1767.	KÖNIG, GEORGE A	Oct. 16, 1874,	Houghton, Mich.
2167.	KRAUSS, FRIEDERICH S	Dec. 20, 1889,	Vienna, Austria.

L

1694.	LAMBERT, GUILLAUME.	Jan'y 19, 1872,	Louvain, Belgium.
1858.	LANDRETH, BURNET.	Jan'y 18, 1878,	Bristol, Pa.
1781.	LANGLEY, SAMUEL P.	April 16, 1875,	Washington, D. C.
1721.	LA ROCHE, C. PERCY	Jan'y 17, 1873,	Philadelphia.
1711.	LAUTH, FRANZ JOSEPH	Oct. 18, 1872,	Munich, Bavaria.
1974.	LAWES, JOHN BENNETT	Jan'y 19, 1883,	Rothamstead, Herts, Eng.
1595.	LEA, HENRY CHARLES.	Oct. 18, 1867,	Philadelphia.
1737.	LE CONTE, JOSEPH.	April 18, 1873,	Berkeley, Cal.
1986.	LEHMAN, AMBROSE E.	April 20, 1883,	Philadelphia.
2182.	LELAND, CHARLES G.	May 16, 1890,	London, Eng.
2174.	LE MOINE, J. M.	Dec. 20, 1889,	Quebec, Canada.
1934.	LE ROY-BEAULIEU, PAUL.	April 15, 1881,	Paris, France.
1382.	LESLEY, J. PETER	July 13, 1856,	Philadelphia.
1376.	LETCHWORTH, ALBERT S.	Jan'y 18, 1856,	"
2085.	LEVASSEUR, EMILE.	May 21, 1886,	Paris, France.
1415.	LEWIS, FRANCIS W.	Jan'y 20, 1860,	Philadelphia.
1756.	LOCKYER, JOSEPH NORMAN. . . .	April 17, 1874,	London, England.
2202.	LOW, SETH	Feb. 19, 1892,	New York, N. Y.
1872.	LONGSTRETH, MORRIS	Sept. 20, 1878,	Philadelphia.
2019.	LUBBOCK, JOHN	July 18, 1881,	London, England.
2003.	LUDLOW, WILLIAM.	Jan'y 18, 1884,	U. S. A.
1629.	LYMAN, BENJAMIN SMITH	Jan'y 15, 1869,	Philadelphia.

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2107.	MACALISTER, JAMES	Dec. 17, 1886,	Philadelphia.
2209.	MACFARLANE, JOHN M.	Dec. 16, 1892,	Lansdowne, Pa.
2042.	MALLET, JOHN WM.	Jan'y 16, 1885,	University of Virginia, Va.
1847.	MANSFIELD, IRA FRANKLIN . . .	Jan'y 18, 1878,	Cannelton, Pa.
1857.	MARCH, FRANCIS ANDREW . . .	Jan'y 18, 1878,	Easton, Pa.
1861.	MARKS, WILLIAM D	May 3, 1878,	Philadelphia.
1604.	MARSH, OTHNIEL C	Oct. 16, 1868,	New Haven, Conn.
2078.	MARSHALL, JOHN	May 21, 1886,	Philadelphia.
1018.	*Martinez, Juan José*	April 20, 1832,	*Spain.*
2184.	MASCART, E.	Dec. 19, 1890,	Paris, France.
1572.	MASON, ANDREW	Jan'y 18, 1867,	New York, N. Y.
2196.	MASPERO, GASTON	May 15, 1891,	Paris, France.
1654.	MAYER, ALFRED M	Oct. 15, 1869,	Hoboken, N. J.
1888.	MCCREATH, ANDREW S.	July 18, 1879,	Harrisburg, Pa.
1821.	MCKEAN, WILLIAM V.	Feb'y 2, 1877,	Philadelphia.
2004.	MCMASTER, JOHN BACH	Jan'y 18, 1884,	"
1677.	MEEHAN, THOMAS	Jan'y 20, 1871,	"
1903.	MERRICK, JOHN VAUGHAN . . .	April 16, 1880,	"
1947.	MERRIMAN, MANSFIELD	Oct. 21, 1881,	Bethlehem, Pa.
1744.	MESSCHERT, MATHEW HUIZINGA.	Oct. 17, 1873,	Douglassville, Pa.

	Name.	*Date of Election.*	*Present Address.*
2142.	MICHAEL, HELEN ABBOTT. . . .	May 20, 1887,	Philadelphia.
2175.	MITCHELL, JAMES T.	Feb'y 21, 1890,	"
1461.	MITCHELL, S. WEIR	Jan'y 17, 1862,	"
2114.	MONIER-WILLIAMS, MONIER . . .	Dec. 17, 1886,	London, England.
1791.	MOORE, GIDEON E	Oct. 15, 1875,	New York, N. Y.
2029.	MOORE, JAMES W	Jan'y 16, 1885,	Easton, Pa.
1841.	MOREHOUSE, GEORGE R	April 20, 1877,	Philadelphia.
1054.	*Morelli.*	Jan'y 15, 1836,	*Naples, Italy.*
1976.	MORRIS, J. CHESTON.	Jan'y 19, 1883,	Philadelphia.
2223.	MORRIS, JOHN G.	Oct. 20, 1893,	Baltimore, Md.
1577.	MORTON, HENRY	Jan'y 18, 1867,	Hoboken, N. J.
2121.	MUCH, MATTHÆUS.	Dec. 17, 1886,	Vienna, Austria.
1866.	MUHLENBERG, F. A.	Sept. 20, 1878,	Reading, Pa.
2120.	MUELLER, FRIEDERICH	Dec. 17, 1886,	Vienna, Austria.
1486.	MUELLER, F. MAX.	Jan'y 16, 1863,	Oxford, England.
2192.	MUNROE, CHARLES E.	May 15, 1891,	Washington, D. C.
2062.	MURDOCK, J. B.	Feb'y 19, 1886,	U. S. Navy.
1937.	MURRAY, JAMES A. H.	April 15, 1881,	Oxford, England.

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2087.	NADAILLAC, MARQUIS DE.	May 21, 1886,	Paris, France.
1852.	NEWCOMB, SIMON	Jan'y 18, 1878,	Washington, D. C.
1582.	NEWTON, HUBERT ANSON	April 19, 1869,	New Haven, Conn.
1703.	NICHOLS, STARR HOYT	July 19, 1872,	New York, N. Y.
2060.	NIKITIN, SERGE	Feb'y 19, 1866,	St. Petersburg, Russia.
1805.	NORDENSKIOLD, ADOLF ERIC . .	April 21, 1876,	Stockholm, Sweden.
1712.	NORRIS, ISAAC.	Oct. 18, 1872,	Philadelphia.
2106.	NORRIS, WILLIAM F.	Dec. 17, 1886,	"
2046.	NORTH, EDWARD.	Oct. 16, 1885,	Clinton, N. Y.

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2072.	OLIVER, CHARLES A.	Feb'y 19, 1886,	Philadelphia.
1715.	OLIVER, JAMES E.	Jan'y 17, 1873,	Ithaca, N. Y.
2195.	OPPERT, JULES.	May 15, 1891,	Paris, France.
2135.	OSBORN, HENRY F.	Feb'y 18, 1887,	New York, N. Y.
2039.	OSLER, WILLIAM	Jan'y 16, 1885,	Baltimore, Md.

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1868.	PACKARD, A. S., JR.	Sept. 20, 1878,	Providence, R. I.
1578.	PACKARD, JOHN H.	Jan'y 18, 1867,	Philadelphia.
1331.	PAGET, JAMES	Jan'y 20, 1854,	London, England.
1984.	PANCOAST, WILLIAM HENRY . . .	Jan'y 19, 1883,	Philadelphia.
2036.	PARVIN, THEOPHILUS	Jan'y 16, 1885,	"
2056.	PASTEUR, LOUIS	Oct. 16, 1885,	Paris, France.
2035.	PATTERSON, C. STUART.	Jan'y 16, 1885,	Philadelphia.
1282.	PATTERSON, ROBERT	April 18, 1851,	"
1320.	PATTERSON, THOMAS L.	April 15, 1853,	Cumberland, Md.
2213.	PATTISON, ROBERT E.	Feb. 17, 1893,	Harrisburg, Pa.
1772.	PEARSE, JOHN B.	Jan'y 15, 1875,	*Boston, Mass.*
1859.	PEIRCE, C. NEWLIN	May 3, 1878,	Philadelphia.
1722.	PEMBERTON, HENRY.	Jan'y 17, 1873,	"
2104.	PEÑAFIEL, ANTONIO	May 21, 1886,	Mexico.
2073.	PENNYPACKER, SAMUEL W. . .	May 21, 1886,	Philadelphia.
1518.	PENROSE, R. A. F.	July 17, 1863,	"

	Name.	*Date of Election.*	*Present Address.*
2059.	PEPPER, EDWARD	Feb'y 19, 1886,	Paris.
1666.	PEPPER, WILLIAM	July 15, 1870,	Philadelphia.
951.	*Pereira, Josè Maria Dantes*	April 18, 1828,	*Lisbon, Portugal.*
1824.	PHILLIPS, HENRY, JR.	Feb'y 2, 1877,	Philadelphia.
1760.	PLATT, FRANKLIN	July 17, 1874,	"
2127.	PLATZMAN, JULIUS	Dec. 17, 1886,	Leipzig, Germany.
2053.	POMIALOWSKY, JOHN	Oct. 16, 1885,	St. Petersburg, Russia.
1539.	PORTER, THOMAS CONRAD	Oct. 21, 1864,	Easton, Pa.
2044.	POTTS, WILLIAM JOHN	Oct. 16, 1885,	Camden, N. J.
2097.	POSTGATE, J. P	May 21, 1886,	Cambridge, England.
2161.	POWELL, J. W.	Oct. 18, 1889,	Washington, D. C.
1619.	PRESTWICH, JOSEPH	Jan'y 15, 1869,	Shoreham, England.
1592.	PRICE, J. SERGEANT	Oct. 18, 1867,	Philadelphia.
1780.	PRIME, FREDERICK, JR	April 16, 1875,	"
2088.	PULZSKY, FRANCIS	May 21, 1886,	Buda-Pesth, Hungary.
1758.	PUMPELLY, RAPHAEL	April 17, 1874,	Newport, R. I.

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1736.	RAND, THEODORE D.	April 18, 1873,	Philadelphia.
1849.	RANDALL, F. A.	Jan'y 18, 1878,	Warren, Pa.
1644.	RAWLINSON, GEORGE.	Oct. 15, 1869,	Oxford, England.
1765.	RAWSON, RAWSON W	Oct. 16, 1874,	London, "
2099.	RAYLEIGH, LORD	May 21, 1886,	Essex, England.
1784.	RAYMOND, ROSSITTER W	April 16, 1875,	New York, N. Y.
1585.	RAYNOLDS, WILLIAM F.	April 19, 1867,	Detroit, Mich.
1591.	READ, JOHN MEREDITH	July 19, 1867.	
2077.	REED, HENRY	May 21, 1886,	Philadelphia.
1889.	REMSEN, IRA	July 18, 1879,	Baltimore, Md.
1948.	RENARD, A	Oct. 21, 1881,	Brussels, Belgium.
1343.	RENARD, CHARLES	Jan'y 20, 1854,	Moscow, Russia.
1890.	RENEVIER, E.	July 18, 1879,	Lausanne, Switzerland.
1816.	REULEAUX, F	Feb'y 2, 1877,	Berlin, Prussia.
2122.	RÉVILLE, ALBERT	Dec. 17, 1886,	Paris, France.
1500.	RICHARDSON, BEN. WARD	April 17, 1863,	London, England.
1808.	RILEY, CHARLES V	April 21, 1876,	Washington, D. C.
2226.	ROBERTS, ISAAC	Oct. 20, 1893,	Starfield, Crowborough, Sussex, England.
1957.	ROBINS, JAMES W.	April 21, 1882,	Philadelphia.
1390.	ROGERS, FAIRMAN.	Jan'y 16, 1857,	Newport, R. I.
2177.	ROGERS, ROBERT W	Feb'y 21, 1890,	Madison, N. J.
1462.	RÖHRIG, F. L. O.	April 18, 1862,	Los Angeles, Cal.
2050.	ROLLETT, HERMANN	Oct. 16, 1885,	Vienna, Austria.
1907.	ROOD, OGDEN N.	April 16, 1880,	New York, N. Y.
1964.	ROSNY, DE, LÉON	July 21, 1882,	Paris, France.
1732.	ROSSI, GIOVANNI BATTISTA.	April 18, 1873,	Rome, Italy.
2198.	ROSENGARTEN, JOSEPH G.	Oct. 16, 1891,	Philadelphia.
1718.	ROTHERMEL, PETER F.	Jan'y 17, 1873,	Linfield, Pa.
1838.	ROTHROCK, JOSEPH T	April 20, 1877,	Philadelphia.
1264.	RUSCHENBERGER, W. S. W.	Oct. 19, 1849,	"
1620.	RUTIMEYER, CARL L.	Jan'y 15, 1869,	Basel, Switzerland.
2109.	RYDER, JOHN A	Dec. 17, 1886,	Philadelphia.

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2230.	SACHSE, JULIUS F	Feb'y 16, 1894,	Philadelphia.
1766.	SADTLER, SAMUEL PHILIP	Oct. 16, 1874,	"
2148.	SAJOUS, CHARLES E.	Feb'y 17, 1888,	Paris, France.

	Name.	*Date of Election.*	*Present Address.*
1563.	SANDBERGER, FRIDOLIN	April 20, 1866,	Würtzburg, Bavaria.
1958.	SARGENT, CHARLES SPRAGUE	April 21, 1882,	Brookline, Mass.
1730.	SAUSSURE, HENRI DE	April 18, 1873,	Geneva, Switzerland.
2211.	SCHAFFER, CHARLES	Feb'y 17, 1893,	Philadelphia.
1498.	SCHOTT, CHARLES ANTHONY	April 17, 1863,	Washington, D. C.
1864.	SCHURZ, CARL	Sept. 20, 1878.	
1725.	SCLATER, PHILLIP LUTLEY	April 18, 1873,	London, England.
1919.	SCOTT, LEWIS A.	Oct. 15, 1880,	Philadelphia.
2112.	SCOTT, W. B.	Dec. 17, 1886,	Princeton, N. J.
1870.	SCUDDER, SAMUEL HUBBARD	Sept. 20, 1878,	Cambridge, Mass.
1883.	SEILER, CARL	April 18, 1879,	Philadelphia.
1704.	SELLERS, COLEMAN	July 19, 1872,	"
1533.	SELLERS, WILLIAM	April 15, 1864,	"
1770.	SELWYN, ALFRED R. C.	Oct. 16, 1874,	Montreal, Canada.
1728.	SELYS, DE, LONGCHAMPS	April 18, 1873,	Liége, Belgium.
2057.	SERGI, GIUSEPPE	Oct. 16, 1885,	Rome, Italy.
1965.	SÈVE DE BAR, EDOUARD	July 21, 1882,	Ramsgate, England.
2076.	SHARP, BENJAMIN	May 21, 1886,	Philadelphia.
1944.	SHARPLES, PHILIP PRICE	Oct. 21, 1881,	West Chester, Pa.
1960.	SHARPLES, STEPHEN PASCHALL	April 21, 1882,	Boston, Mass.
1797.	SHERWOOD, ANDREW	Oct. 15, 1875,	Mansfield, Pa.
1822.	SHIELDS, CHARLES W.	Feb'y 2, 1877,	Princeton, N. J.
1532.	*Shinz, Carl*	April 15, 1864,	*Strasburg, Germany.* (?)
2146.	SMITH, EDGAR F.	Oct. 21, 1887,	Philadelphia.
1544.	SMITH, GOLDWIN	Jan'y 20, 1865.	
1789.	SMITH, STEPHEN	Oct. 15, 1875,	New York, N. Y.
2141.	SMYTH, ALBERT H.	May 20, 1887,	Philadelphia.
1742.	SNOWDEN, A. LOUDON	Oct. 17, 1873,	"
2009.	SNYDER, MONROE B	Jan'y 18, 1884,	"
2189.	SPANGLER, HENRY W	May 15, 1891,	"
1720.	SPOFFORD, A. R.	Jan'y 17, 1873,	Washington, D. C.
1949.	STALLO, JOHN B.	Oct. 21, 1881,	Cincinnati, O.
1446.	STEENSTRUP, J. J. S.	Jan'y 17, 1862,	Copenhagen, Denmark.
1990.	STEVENS, WALTER LECONTE	Jan'y 18, 1884,	Troy, N. Y.
1840.	STEVENSON, JOHN JAMES	April 20, 1877,	New York, N. Y.
2168.	STOKES, GEORGE G.	Dec. 20, 1889,	London, England.
1559.	STRONG, WILLIAM	Jan'y 19, 1866,	Washington, D. C.
1820.	STUART, GEORGE	Feb'y 2, 1877,	Philadelphia.
2193.	STUBBS, WILLIAM	May 15, 1891,	Oxford, England.
2094.	SUESS, EDWARD	May 21, 1886,	Vienna, Austria.
2023.	SYLE, E. W.	July 18, 1884,	Philadelphia.
1844.	SYLVESTER, J. J.	July 20, 1877,	Oxford, England.
2092.	SZOMBATHY, JOSEF	May 21, 1886,	Vienna, Austria.

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1786.	TATHAM, WILLIAM P.	April 16, 1875,	Philadelphia.
1846.	TAYLOR, WILLIAM B.	Oct. 19, 1877,	Washington, D. C.
2098.	TEMPLE, RICHARD CARNAC	May 21, 1886,	Upper Burmah, India.
2006.	THOMAS, ALLEN C.	Jan'y 18, 1884,	Haverford, Pa.
1993.	THOMPSON, HEBER S.	Jan'y 18, 1884,	Pottsville, Pa.
1726.	THOMPSON, HENRY.	April 18, 1873,	London, England.
1807.	THOMSON, ELIHU	April 21, 1876,	Swampscott, Mass.
1754.	THOMSON, FRANK	April 17, 1874,	Philadelphia.
1723.	THOMSON, WILLIAM (see LORD KELVIN)	April 18, 1873,	London, England.
1909.	THOMSON, WILLIAM	April 16, 1880,	Philadelphia.

	Name.	*Date of Election.*	*Present Address.*
1530.	THURY, A.	April 15, 1864,	Geneva, Switzerland.
1688.	TILGHMAN, BENJAMIN C	July 21, 1871,	Philadelphia.
1233.	TILGHMAN, RICKARD A	April 16, 1847,	"
1657.	TILGHMAN, WILLIAM M.	Jan'y 21, 1870,	"
2176.	TIMMINS, SAMUEL	Feb. 21, 1890,	Arley, near Coventry, Eng.
2123.	TOPINARD, PAUL.	Dec. 17, 1886,	Paris, France.
2065.	TOPPAN, ROBERT NOXON.	Feb'y 19, 1886,	Cambridge, Mass.
1597.	TOWNSEND, JOSEPH B	Jan'y 17, 1868.	Philadelphia.
2024.	TRUMBULL, HENRY CLAY	July 18, 1884,	"
1973.	TSCHERMAK, GUSTAF	Oct. 20, 1882,	Vienna, Austria.
1983.	TURRETTINI, THEODORE	Dec. 19, 1890,	Geneva, Switzerland.
2166.	TUTTLE, DAVID K	Oct. 18, 1889,	Philadelphia.
2163.	TYLER, LYON G	Oct. 18, 1889,	Williamsburg, Va.
1529.	TUNNER, PETER	April 15, 1864,	Leoben, Austria.
2138.	TYSON, JAMES	May 20, 1887,	Philadelphia.

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2185.	UNWIN, WILLIAM C	Dec. 19, 1890,	London, England.

V

2000.	VAUX, RICHARD.	Jan'y 18, 1884,	Philadelphia.
2045.	VERE, DE, SCHEELE M.	Oct. 16, 1885,	University of Virginia, Va.
1475.	VIRCHOW, RUDOLPH.	Oct. 17, 1862,	Berlin, Prussia.
1646.	VOGT, CARL	Oct. 15, 1869,	Geneva, Switzerland.
2115.	VON MELTZEL, HUGO	Dec. 17, 1886,	Koloszvar, Hungary.
1670.	VOSE, GEORGE LEONARD.	Oct. 21, 1870,	Boston, Mass.
2186.	VOSSION, LOUIS	Dec. 19, 1890,	Philadelphia.

W

2034.	WAGNER, SAMUEL	Jan'y 16, 1885,	Philadelphia.
1748.	WAHL, WILLIAM H.	Jan'y 16, 1874,	"
1724.	WALLACE, ALFRED R	April 18, 1873,	Parkston, Dorset, England.
2156.	WARD, LESTER F.	May 17, 1889,	Washington, D. C.
2033.	WEIL, EDWARD HENRY	Jan'y 16, 1885,	Philadelphia.
2028.	WEISBACH, ALBIN	Jan'y 16, 1885,	Freiburg, Saxony.
1639.	WHARTON, JOSEPH.	April 16, 1869,	Philadelphia.
1637.	WHITE, ANDREW D.	April 16, 1869,	Ithaca, N. Y.
1848.	WHITE, ISRAEL C.	Jan'y 18, 1878,	Morgantown, W. Va.
1487.	WHITNEY, JOSIAH DWIGHT	Jan'y 16, 1863,	Cambridge, Mass.
1863.	WILDER, BURT GREEN	May 3, 1878,	Ithaca, N. Y.
2151.	WILLIAMS, TALCOTT	May 18, 1888,	Philadelphia.
2178.	WILLIS, HENRY	Feb'y 21, 1890,	"
2150.	WILSON, EDMUND B	Feb'y 17, 1888,	Bryn Mawr, Pa.
2041.	WILSON, JAMES CORNELIUS.	Jan'y 16, 1885,	Philadelphia.
1747.	WILSON, JOSEPH M.	Jan'y 16, 1874,	"
2137.	WILSON, WILLIAM POWELL	May 20, 1887,	"
2223.	WINSOR, JUSTIN	May 19, 1893,	Cambridge, Mass.
2140.	WIREMAN, HENRY D.	May 20, 1887,	Philadelphia.
2220.	WISTAR, ISAAC J.	May 19, 1893,	"
1561.	WISTER, OWEN JONES	April 20, 1866,	"
1884.	WOOD, RICHARD.	April 18, 1879,	"
1762.	WOODWARD, HENRY.	July 17, 1874,	London, England.
1751.	WOOTTEN, J. E.	Jan'y 16, 1874,	Reading, Pa.
1854.	WORMLEY, THEODORE G.	Jan'y 18, 1878,	Philadelphia.

Name.	*Date of Election.*	*Present Address.*
1932. WURTS, CHARLES STEWART . . .	Jan'y 21, 1881,	Philadelphia.
2061. WYCKOFF, A. B.	Feb'y 19, 1886,	Seattle, Wash.

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1904. YARNALL, ELLIS	April 16, 1880,	Philadelphia.
1759. YOUNG, CHARLES AUGUSTUS . . .	April 17, 1874,	Princeton, N. J.